SPECIAL ISSUE: World IT Sales Grow 9% To $279B

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A CAHNERS PUBLICATION

DATAMATION

FOR MANAGERS OF INFORMATION TECHNOLOGY WORLDWIDE

JUNE 15, 1991

THE DATAMATION 100

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With Scorecards On The Best In:

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INSIGHTS FROM OVER 100 EXECUTIVES

VOLUME 37 JUNE 15, 1991 NUMBER 12

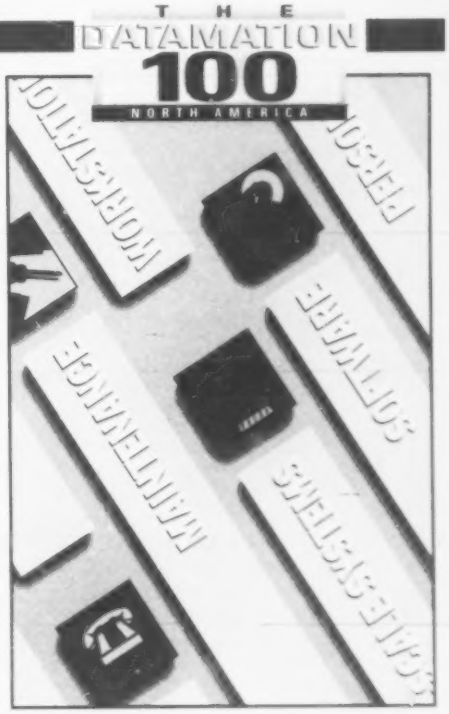
DATAMATION

FOR MANAGERS OF INFORMATION TECHNOLOGY WORLDWIDE

COVER STORY

World IT Sales Grow 8.9% To $278.5B; North America Hits $184.7B

BY JOSEPH KELLY Despite the recession, the top 100 North American information technology suppliers grew their PC, midrange, workstation, software and services businesses at a healthy clip in 1990. But sellers of mainframes and datacom equipment hit the skids. **PAGE 10**



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An Expanded DATAMATION 100

The year 1990 marks the 10th anniversary of the DATAMATION 100 and the 15th year of the magazine's efforts to measure the information technology industry. In 1976, DATAMATION began ranking the top 50 U.S. suppliers of information technology. In 1980, we doubled the number of U.S. companies ranked and profiled annually, thereby creating what has become an institution: The DATAMATION 100. Five years later, in 1985, DATAMATION expanded the exercise worldwide and for the first time covered European and Japanese suppliers.

This year, we once again expand the famous franchise by profiling 100 U.S. companies and 50 overseas companies. We will present this DATAMATION 100 research in three parts:

- This Issue: The DATAMATION 100: The Top 100 Worldwide Suppliers
  The Top 100 North American Suppliers
  Profiles of the Top 100 North American Suppliers
- July 1: The European 25: The Top 25 European IT Suppliers
  Profiles of the Top 25 European Suppliers
- September 1: The Asian 25: The Top 25 Asian IT Suppliers
  Profiles of the Top 25 Asian Suppliers

How We Count The Beans

All figures are for calendar year 1990. For companies operating on a fiscal year that doesn't coincide with the calendar year, DATAMATION either compiles quarterly information or relies on the estimates of the companies themselves or industry analysts. DATAMATION also allows companies to restate the previous year's figures. We do not include revenues from basic data transmission services, stand-alone typewriters or cash registers, instrumentation, semiconductors, printed circuit boards, automatic test equipment, supplies (with the exception of magnetic media), industrial control devices, central office telephone switches, analog PBXs or computer-output micrographic systems.

Currencies for foreign companies are computed based on the 1990 floating year figure provided by the Organization for Economic Cooperation and Development.

With Thanks

Over the last five years, the efforts of New York City-based freelancer Joe Kelly have been invaluable. Once again this year, Joe has served as strategist, overview and profile writer and overall guidance counselor.

With Joe in the control tower has been our editorial researcher Susan Mael, who over the past three months has spent countless hours on the phone and in front of the fax machine persuading companies to send in their financial data.

Providing critical assistance with Asian-based company financial data was Hugo X. Hsiung, an editor with our sister publication *Electronic Business Asia*. We are indebted to him for his able service.

And last, but certainly not least, DATAMATION wishes to acknowledge and thank Gary M. Fishman, a consultant for Commodore International Ltd., who has adapted a hypertext program designed specifically for the DATAMATION 100.

Mr. Fishman has put a template of our questionnaire on floppy disk, which we are sending to the 250 or so companies we research for this project, so that they may keep a running account of their activities over the year. The menu-driven program can run on any 286 PC or higher. In addition to providing a convenient way to record the financial statistics we gather each year, the program also offers opportunities to include a corporate summary, quarterly financial information, new product releases and organizational changes as they occur throughout the year.

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World IT Sales Grow 8.9% To $278.5B

North America Hits $184.7B

Despite the recession, the top 100 North American information technology suppliers grew their PC, midrange, workstation, software and services businesses at a healthy clip in 1990. But sellers of mainframes and datacom equipment hit the skids.

BY JOSEPH KELLY

Even before the drum beats heralded the onset of war last August, you could already hear the sound of the last eight years of economic growth coming to a screeching halt.

A morass of bank failures, sluggish housing starts and lackluster auto sales helped push the U.S. economy into a recession. Layoffs and downsizing were the order of the day. In Europe, not even a reunited Germany and the prospect of a more unified, post-1992 pan-European market could overcome weakened consumer and capital spending. And in Japan, higher interest rates plus the wounded stock and real estate markets took some of the glow off the country's still impressive economic machine.

But, like so much else, this first recession of the post-Cold War world is marching down its own path. Unlike in the recessions of 1982 or 1973, capital spending is being trimmed, not trashed. And surveys by both the U.S. Commerce Department and Dun & Bradstreet Corp. show slim signs of recovery. Both project slight increases in inflation-adjusted capital spending for 1991. This is consistent with DATAMATION's latest IS budget survey, which indicates 1991 budgets rising a slight 3.4%. However, even though the prime lending rate has dropped, bank lending remains conservative, which does not bode well for future growth.

This good news/bad news scenario is echoed in the U.S. economy's various industrial sectors. Manufacturing companies by and large entered this recession in better shape than they did the last time around, having spent much of the 1980s modernizing and slashing payrolls. This means they will be ready to profit quickly when the economy turns up again. Some companies may not feel the recession at all. But service companies—from airlines and advertising to telecommunications firms and the brokerage houses that line Wall Street—are finding this recession a real bear.

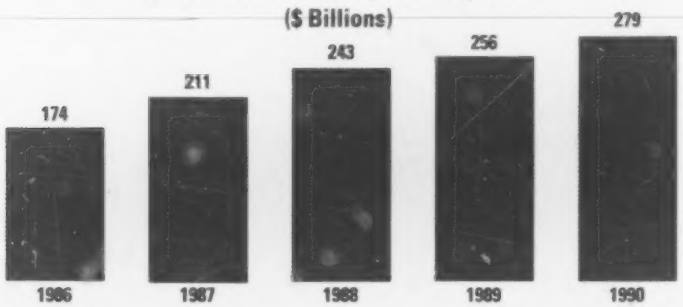
The Dynamics Of IT

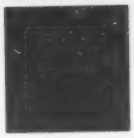
The IS industry has always been considered resistant to recessions and, arguably, the conventional wisdom still holds true. The figures compiled for this year's DATAMATION 100, which ranks the leading IS companies based on their calendar year sales, show an industry that, in its fifth decade, still retains the trappings of growth. It is an industry still able to create products and services that hold their appeal whatever the economic climate. In total, the IS revenues of the world's top 100 IS companies grew 8.9% to $278.5 billion, not a bad showing compared with the 5.3% growth of 1989. Buoyant sales of workstations, peripherals (primarily storage devices and laser printers), software and services boosted the revenues of those companies quick and wise enough to jump into those fast-growing arenas.

The weak dollar also helped U.S. companies boost sales overseas, while limiting the appeal of imported products in the United States. Revenue for the top 100 U.S. and Canadian companies, which are profiled

And So IT Grows

Revenues from the DTM 100 climbed more than $100 billion over the past five years.





in this issue, rose 10.5% over 1989's level to $184.7 billion. That's also a jump from 1989, in which the revenues of the top 100 North American companies climbed only 5.9% higher than 1988. And net earnings for the top 100 North American firms in 1990 rose 8.1%, a welcome relief from the 8.3% earnings drop suffered in 1989.

Topping the growth list this year were workstation sales, which soared 34.7% in 1990. This growth is primarily a reflection of the tremendous success of IBM's RS/6000 line, which more than doubled in sales to around $1 billion, and a 33% increase in sales at Sun Microsystems Inc.

Revenue from peripheral devices, which account for one out of every five dollars received by the top 100 North American IS vendors, rose 18.9% in 1990. The growth in peripherals came from companies like Conner Peripherals and Quantum, which did well in microcomputer disk drives. IBM and Storage Technology Corp. also enjoyed strong demand for their mainframe storage products. Hewlett-Packard Co. continued to see healthy sales of its laser printers.

Sales of personal computers by North American firms broke the $25 billion mark and now account for 14% of the top 100 North American vendors' revenues. But the 12.6% growth in PC sales in 1990 is a far cry from the stunning growth patterns of the mid-1980s and reflects the raging price war being led by Apple Computer Inc., AST Research Inc. and Dell.

In general, the current recession has probably had the effect of delaying or canceling purchases of larger scale systems. As a result, the dollar volume generated by mainframe sales in 1990 fell 10.1% to $14.4 billion. IBM's sales of mainframes dropped some 12% from $12.1 billion to $10.6 billion, while Amdahl's sales declined over $100 million to $1.36 billion. Both drops were due in part to customers anticipating new products slated for introduction this year.

The Open Question

While the effects of the recession spread unevenly through the industry last year, another force was moving relentlessly in the background. Over the last two years, the trend toward open systems has had a profound effect on older hardware manufacturers, such as Data General Corp., Digital Equipment Corp., IBM, Prime Computer Inc., Unisys Corp. and Wang Laboratories Inc. The pricing of open systems products undercuts the margins these companies were formerly able to obtain on their proprietary systems. But the organizational structures of these firms are characterized by large direct sales and support forces, which had been supported by the big profits that the

Text continued on page 16

The DATAMATION 100

WORLD RANK '90	'89	COMPANY	REVENUE*
1	1	IBM	67,090.0
2	2	Digital	13,072.3
3	4	Fujitsu	12,361.5
4	3	NEC	12,350.3
5	6	Hitachi	9,590.9
6	5	Unisys	9,302.0
7	7	Hewlett-Packard	9,300.0
8	N/A	Siemens/Nixdorf	7,735.1
9	10	Olivetti	6,414.5
10	8	Groupe Bull	6,349.6
11	11	Apple	5,740.0
12	12	NCR	5,617.0
13	13	Toshiba	4,764.5
14	14	Canon	4,669.2
15	15	Matsushita	3,731.0
16	16	Compaq	3,598.0
17	18	NV Philips	3,283.9
18	17	AT&T	2,900.0
19	23	EDS	2,870.0
20	N/A	ICL	2,862.9
21	20	Xerox	2,800.0
22	27	Sun	2,762.8
23	34	Seagate	2,667.6
24	21	Wang	2,363.0
25	25	Nihon Unisys	2,279.0
26	26	Amdahl	2,158.8
27	24	NTT	2,114.0
28	29	Mitsubishi	2,055.5
29	30	Oki	1,989.0
30	28	Memorex-Telex	1,951.2
31	32	Alcatel	1,890.0
32	37	Tandem	1,873.1
33	38	TRW	1,852.0
34	33	Ricoh	1,774.3
35	45	Andersen Consulting	1,748.4
36	36	ADP	1,730.0
37	48	Cap Gemini	1,684.9
38	41	CSC	1,679.3
39	42	C. Itoh	1,595.1
40	40	Seiko Epson	1,590.7
41	39	Prime	1,589.0
42	50	Microsoft	1,480.0
43	60	Conner Peripherals	1,337.5
44	44	Computer Associates	1,310.7
45	46	Nokia	1,279.9
46	43	Data General	1,237.4
47	47	Northern Telecom	1,220.0
48	31	Tandy	1,214.7
49	49	StorageTek	1,141.0
50	35	Control Data	1,121.9
51	57	Oracle	1,058.9
52	52	Intergraph	1,044.6
53	51	Commodore	995.7
54	55	Intel	980.0
55	53	Motorola	954.0
56	54	Mannesmann	893.2
57	61	3M	875.0
58	64	Finsiel	861.2
59	65	American Express	827.0
60	56	Cray	804.4
61	58	General Electric	800.0
62	81	Maxtor	789.4
63	62	British Telecom	776.8
64	75	Acer	751.0
65	91	Quantum	716.3
66	67	Texas Instruments	700.0
67	68	Racal	693.0
68	N/A	Tatung	693.0
69	63	Black & Decker	692.1
70	69	Comparex	689.4
71	70	Lotus	684.5
72	74	NYNEX	618.0
73	71	SHL	599.0
74	76	AST Research	586.5
75	77	Science Applications	569.0
76	72	CSK	553.9
77	73	Martin Marietta	549.4
78	93	Dell	546.0
79	79	D&B Software	539.0
80	95	Sema Group	533.4
81	89	Sligos	530.7
82	59	Amstrad	518.7
83	84	Novell	497.5
84	66	Lockheed	494.0
85	80	Ernst & Young	490.0
86	101	Silicon Graphics	482.1
87	N/A	Western Digital	460.2
88	78	Wyse	460.0
89	83	SD-Scicon	455.6
90	117	WordPerfect	452.4
91	94	Mitac	440.0
92	87	3Com	437.0
93	85	Mentor	435.2
94	97	Kyocera	433.3
95	88	Everex	427.6
96	96	Tandon	421.8
97	103	Stratus	403.9
98	86	Alps	403.3
99	92	Shared Medical	403.1
100	115	McDonnell Douglas	398.0

* All revenue figures are in $ millions.

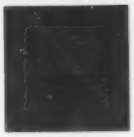
THE DATAMATION 100

COVER STORY

The DATAMATION North American 100

1990 US RANK	1989 US RANK	1989 WORLD RANK	COMPANY	1990 IS REV.	1989 IS REV.	IS REV. % CHANGE	1990 TOTAL REV.	IS AS % OF TOTAL REV.	NET EARNINGS
1	1	1	IBM	67,090.0	60,805.0	10.34%	69,018.0	97.21%	6,020.0
2	2	2	Digital	13,072.3	12,936.7	1.05%	13,072.3	100.00%	-94.5
3	3	6	Unisys	9,302.0	9,390.0	-0.94%	10,111.0	92.00%	-437.0
4	4	7	Hewlett-Packard	9,300.0	7,800.0	19.23%	13,233.0	70.28%	739.0
5	5	11	Apple	5,740.0	5,372.3	6.84%	5,740.0	100.00%	500.6
6	6	12	NCR	5,617.0	5,319.0	5.60%	6,178.7	90.91%	369.0
7	7	16	Compaq	3,598.0	2,876.1	25.10%	3,598.0	100.00%	454.9
8	8	18	AT&T	2,900.0	2,865.0	1.22%	37,285.0	7.78%	2,735.0
9	11	19	EDS	2,870.0	2,477.9	15.82%	6,108.8	46.98%	496.9
10	9	21	Xerox	2,800.0	2,790.0	0.36%	17,973.0	15.58%	243.0
11	13	22	Sun	2,762.8	2,062.5	33.96%	2,762.8	100.00%	151.0
12	15	23	Seagate	2,667.6	1,797.0	48.45%	2,667.6	100.00%	99.7
13	10	24	Wang	2,363.0	2,697.0	-12.38%	2,363.0	100.00%	-665.4
14	12	26	Amdahl	2,158.8	2,101.0	2.75%	2,158.8	100.00%	184.0
15	18	32	Tandem	1,873.1	1,676.8	11.71%	1,873.1	100.00%	98.1
16	19	33	TRW	1,852.0	1,643.0	12.72%	8,169.0	22.67%	208.0
17	24	35	Andersen Consulting	1,748.4	1,225.7	42.65%	1,880.0	93.00%	N/A
18	17	36	ADP	1,730.0	1,689.5	2.40%	1,750.0	98.86%	250.0
19	21	38	CSC	1,679.3	1,442.8	16.39%	1,679.3	100.00%	68.0
20	20	41	Prime	1,589.0	1,518.0*	4.68%	1,589.0	100.00%	19.0
21	27	42	Microsoft	1,480.0	952.8	55.33%	1,480.0	100.00%	355.6
22	35	43	Conner Peripherals	1,337.5	704.9	89.74%	1,337.5	100.00%	62.8
23	23	44	Computer Associates	1,310.7	1,290.1	1.60%	1,310.7	100.00%	162.0
24	22	46	Data General	1,237.4	1,314.4*	-5.86%	1,237.4	100.00%	-119.3
25	25	47	Northern Telecom	1,220.0	1,150.0	6.09%	6,768.7	18.02%	460.2
26	14	48	Tandy	1,214.7	980.3*	23.91%	4,648.1	26.13%	261.3
27	26	49	StorageTek	1,141.0	982.5	16.13%	1,141.0	100.00%	69.0
28	16	50	Control Data	1,121.9	2,900.0*	-61.31%	1,691.0	66.35%	2.7
29	33	51	Oracle	1,058.9	769.3	37.64%	1,058.9	100.00%	57.4
30	29	52	Intergraph	1,044.6	860.1	21.45%	1,044.6	100.00%	62.6
31	28	53	Commodore	995.7	866.5	14.91%	995.7	100.00%	40.2
32	31	54	Intel	980.0	812.0	20.69%	3,921.0	24.99%	650.0
33	30	55	Motorola	954.0	860.0	10.93%	10,885.0	8.76%	499.0
34	36	57	3M	875.0	735.0*	19.05%	13,021.0	6.72%	1,308.0
35	38	60	American Express	827.0	660.0	25.30%	24,332.0	3.40%	181.0
36	32	61	Cray	804.4	784.7	2.51%	804.4	100.00%	113.0
37	34	62	General Electric	800.0	740.0	8.11%	58,400.0	1.37%	4,300.0
38	50	63	Maxtor	789.4	447.2	76.52%	789.4	100.00%	10.8
39	57	66	Quantum	716.3	394.2	81.71%	716.3	100.00%	66.7
40	40	67	Texas Instruments	700.0	585.0	19.66%	6,567.0	10.66%	-39.0
41	37	70	Black & Decker	692.1	687.6	0.65%	4,832.3	14.32%	51.1
42	41	72	Lotus	684.5	556.0	23.11%	684.5	100.00%	23.3
43	44	74	NYNEX	618.0	495.0	24.85%	13,585.0	4.55%	949.4
44	42	75	SHL	599.0	539.8	10.97%	599.0	100.00%	-35.0
45	45	76	AST Research	586.5	482.0	21.68%	586.5	100.00%	52.5
46	46	77	Science Applications	569.0	479.0	18.79%	1,163.0	48.93%	33.3
47	43	79	Martin Marietta	549.4	502.2	9.40%	6,125.9	8.97%	327.6
48	59	80	Dell	546.0	388.6	40.50%	546.0	100.00%	27.2
49	48	81	[illegible] Software	539.0	450.0	19.78%	4,800.0	11.23%	508.0
50	52	85	Novell	497.5	429.9	15.72%	497.5	100.00%	94.3

All revenue figures are in $ millions
*Revenue figure restated
N/A = Not available



The DATAMATION North American 100

1990 US RANK	1989 US RANK	1989 WORLD RANK	COMPANY	1990 IS REV.	1989 IS REV.	IS REV. % CHANGE	1990 TOTAL REV.	IS AS % OF TOTAL REV.	NET EARNINGS
51	39	86	Lockheed	494.0	590.0	-16.27%	9,958.0	4.96%	335.0
52	49	87	Ernst & Young	490.0	450.0	8.89%	5,000.0	9.80%	N/A
53	63	88	Silicon Graphics	482.1	343.0	40.55%	482.1	100.00%	39.8
54	N/A	89	Western Digital	460.2	N/A	N/A	1,068.8	43.06%	-78.6
55	47	90	Wyse	460.0	452.3	1.70%	460.0	100.00%	N/A
56	74	92	WordPerfect	452.4	281.4*	60.77%	452.4	100.00%	N/A
57	54	94	3Com	437.0	413.9	5.58%	437.0	100.00%	24.0
58	53	95	Mentor	435.2	426.4	2.06%	435.2	100.00%	23.6
59	55	97	Everex	427.6	402.0	6.37%	427.6	100.00%	-0.8
60	60	98	Tandon	421.8	377.9	11.62%	421.8	100.00%	25.6
61	65	99	Stratus	403.9	341.3	18.34%	403.9	100.00%	37.0
62	58	101	Shared Medical	403.1	390.0	3.36%	403.1	100.00%	22.7
63	72	102	McDonnell Douglas	398.0	390.0*	2.05%	16,255.0	2.45%	15.0
64	56	105	MAI Systems	389.5	397.0	-1.89%	389.5	100.00%	-64.5
65	N/A	106	Software AG	389.0	294.9	31.91%	389.0	100.00%	N/A
66	68	108	Micropolis	381.0	307.0	24.10%	381.0	100.00%	8.0
67	70	110	Price Waterhouse	370.0	305.0	21.31%	2,900.0	12.76%	N/A
68	67	111	Bell Atlantic	350.0	320.0	9.38%	12,298.0	2.85%	1,312.5
69	80	114	Diebold	328.4	243.8	34.70%	476.1	68.98%	27.1
70	64	115	Atari	325.7	374.5*	-13.03%	411.5	79.16%	14.9
71	61	116	Boeing	320.0	359.2	-10.91%	28,043.0	1.14%	448.0
72	51	117	Kodak	320.0	445.0	-28.09%	18,908.0	1.69%	703.0
73	62	119	Concurrent	296.0	345.0*	-14.20%	296.0	100.00%	-60.0
74	73	120	Tektronix	291.4	287.5*	1.36%	1,395.9	20.88%	-70.1
75	69	121	Gerber Scientific	279.8	306.1	-8.58%	279.8	100.00%	32.4
76	76	122	Policy Management	272.0	205.4*	32.42%	346.1	78.59%	37.2
77	71	123	Datapoint	265.6	299.0	-11.17%	265.6	100.00%	-66.7
78	85	125	American Management	261.9	225.3	16.25%	261.9	100.00%	10.4
79	88	126	Systematics	255.0	224.0*	13.84%	255.0	100.00%	N/A
80	82	127	Reynolds & Reynolds	252.0	253.2*	-0.47%	595.3	42.33%	24.4
81	93	128	ASK Computer	249.7	189.6*	31.70%	249.7	100.00%	4.7
82	N/A	129	Sequent	248.8	145.6	70.91%	248.8	100.00%	18.8
83	75	130	National Data	244.6	275.7	-11.28%	244.6	100.00%	5.5
84	83	131	Computer Task Group	243.9	233.0	4.68%	243.9	100.00%	7.2
85	90	132	SAS Institute	240.2	205.6	16.83%	240.2	100.00%	N/A
86	96	133	Autodesk	237.9	178.6	33.20%	237.9	100.00%	56.8
87	79	134	Recognition Equipment	230.6	255.9*	-9.89%	230.6	100.00%	-31.7
88	77	135	Ashton-Tate	230.5	265.3	-13.12%	230.5	100.00%	-18.1
89	84	136	Pansophic	230.0	196.4*	17.09%	232.2	99.05%	-14.3
90	N/A	138	Coopers & Lybrand	221.0	140.0	57.86%	4,100.0	5.39%	N/A
91	100	139	Cadence	216.7	145.2*	49.24%	231.4	93.63%	38.0
92	98	141	Convex	209.3	158.6	31.97%	209.3	100.00%	18.4
93	97	142	Cincom	207.7	165.1*	25.80%	207.7	100.00%	N/A
94	95	143	Sterling	207.0	184.4*	12.26%	207.0	100.00%	12.4
95	78	144	Bolt Beranek & Newman	204.3	236.2*	-13.49%	261.9	78.00%	-34.8
96	91	145	HBO & Co.	201.5	203.6	-1.03%	201.5	100.00%	7.1
97	N/A	146	Pyramid	200.5	114.4	75.19%	200.5	100.00%	18.4
98	92	147	General DataComm	199.4	201.2	-0.89%	199.4	100.00%	-0.3
99	89	148	Ultimate	196.9	206.5	-4.64%	196.9	100.00%	125.0
100	N/A	149	Information Builders	190.0	160.0	18.75%	190.0	100.00%	N/A

All revenue figures are in $ millions
*Revenue figure restated
N/A = Not available

Fast Trackers

The companies that grew the most in 1990.

	COMPANY	1990 IS REVENUE	1989 IS REVENUE	% INCREASE
1	Conner Peripherals	1,337.5	704.9	89.74%
2	Quantum	716.3	394.2	81.71%
3	Maxtor	789.4	447.2	76.52%
4	Pyramid	200.5	114.4	75.19%
5	Sequent	248.8	145.6	70.91%
6	WordPerfect	452.4	281.4	60.77%
7	Coopers & Lybrand	221.0	140.0	57.86%
8	Microsoft	1,480.0	952.8	55.33%
9	Cadence	216.7	145.2	49.24%
10	Seagate*	2,667.6	1,797.0	48.45%

All revenue figures in millions.
*Revenue change due to merger

proprietary systems used to command. These computer makers are finding such structures to be ill-adapted to the new high-volume, low margin economic model.

One response has been consolidation and restructuring, amply evident last year. Witness the mergers of Siemens AG and Nixdorf Computer AG in Germany; Fujitsu Ltd.'s purchase of the struggling U.K. mainframe company, International Computers Ltd.; and the AT&T/NCR Corp. merger. In each case, consolidation was spurred by the need for greater scale to overcome weaker margins. A company has to be big enough to spread the costs of marketing and R&D over a broad product line.

The pending AT&T/NCR deal is a prime example of the trend. By all rights, AT&T, which invented UNIX, should be riding high today. But it lacked the computer industry marketing experience and the organization it needed, and it failed to turn a profit in any of the six years since divestiture. In buying NCR, AT&T gets an old-line IS manufacturer that successfully reoriented its product line toward open systems products, but that would have been hard pressed to muster the large scale needed to survive the lowered margins these products bring.

By intensifying the existing pressure on hardware profits, the recession is bringing into sharper focus a new competitive structure in IS that centers around the following:

■ **A humbled but still dominant IBM.** In 1989, IBM lost money on its U.S. sales and was forced to bite the bullet with a $2.3 billion restructuring. Big Blue reaped the benefits in 1990 with a solid $6 billion in earnings. With a new line of mainframes on the market, and very competitive midrange and workstation offerings, IBM has strong products in key market sectors.

■ **Transition at the midrange.** Nowhere is IBM's dominance more obvious this year than at the midrange, where its proprietary AS/400 mini did so well that it propped up the entire category, which grew at 12%. Remove IBM from the equation, however, and the effects of the shift toward open systems becomes clearer. Many vendors making the transition from proprietary to UNIX-based systems have taken it on the chin. Wang's mini revenues fell 24%, Prime's and Data General's fell more than 16%. HP's mini revenues dropped 2.4%, and Unisys's fell 1.9%. Digital and Tandem Computers Inc. turned in modest increases in the 6–9% range. Both Digital and Tandem have strategies to shift to open systems; HP must successfully build on its 1989 acquisition of Apollo Computer Inc. Mergers are likely, and missteps are not allowed. Companies like Mips Computer Systems Inc., Pyramid Technology Corp., Sequent Computer Systems Inc. and Sun, which have successfully built product lines using open architectures, are ready to step in and pick up the pieces at the merest hint of desperation.

■ **The changing desktop.** The desktop PC, the most powerful IS innovation of the 1980s, will face stiff competition in the next few years from laptop and notebook-sized computers. Although they are relatively expensive now, the price point will decline, making these machines even more attractive compared with traditional desktop systems. Desktop systems, too, have ridden the pricing curve downward. Apple, for example, introduced the $1,000 Mac Classic, marking a major shift in strategy for Apple, which has long enjoyed some of the fattest margins in all of IS. Margins on these machines are as small as their LCD screens. By cutting its prices in half, Apple has fired its biggest gun in the PC price war and found itself almost immediately trampling on IBM's market share. In sales during the first quarter of 1991, Apple's share exceeded IBM's for the first time. Meanwhile, in the IBM-compatible market, AST Research and Dell are putting the squeeze on both IBM and Compaq Computer Corp.

Falling Fortunes

The companies that couldn't keep up.

	COMPANY	1990 IS REVENUE	1989 IS REVENUE	% DECREASE
1	Control Data*	1,121.9	2,900.0	-61.31%
2	Kodak*	320.0	445.0	-28.09%
3	Lockheed*	494.0	590.0	-16.27%
4	Concurrent	296.0	345.0	-14.20%
5	Bolt Beranek & Newman	204.3	236.2	-13.49%
6	Ashton-Tate	230.5	265.3	-13.12%
7	Atari	325.7	374.5	-13.03%
8	National Data	244.6	275.7	-11.28%
9	Datapoint	265.6	299.0	-11.17%
10	Boeing	320.0	359.2	-10.91%

All revenue figures in millions.
* Revenue change due to disacquisition

■ **The rise of Microsoft.** The biggest event of 1990 was clearly the massive sales of Windows 3.0. Marc Schulman, who follows IS for UBS Securities Inc., likens the popularity of Windows 3.0 to the impact of IBM's family of 360 mainframes in the 1960s. According to Schulman, Windows is pivotal in establishing Microsoft as a company that no longer rides IBM's coattails. In addition to its dominance of the PC operating system market, Microsoft is a powerful force in both the IBM and Macintosh applications world. And the Redmond, Wash., giant is readying its assault on the workstation world. In 1990, Microsoft surpassed Computer Associates International Inc. to become the largest company on the DATAMATION 100 devoted entirely to software.

Software And Services Are Hot

Microsoft, of course, was not the only software company to prosper last year. In general, the new choices created by open systems and the pressures on user companies to gain greater efficiency in down times was good news for both software and services companies. Software and services, including hardware maintenance, accounted for 23% of DATAMATION North American 100 sales in 1990. There are now 39 companies on the North American list that specialize primarily in software and services.

Some PC software companies, which alone accounted for more than $3 billion in sales in 1990, are growing 25 to 30% a year, a rate that is unlikely to be hampered by the recession. "PC software packages offer astonishing paybacks of 10 to 20 times cost within one year," says Michael Kwatinetz, an analyst for Sanford C. Bernstein & Co. Inc., a New York City-based investment research firm. Kwatinetz predicts that presentation graphics software, such as Harvard Graphics, will grow the fastest of any applications software.

Services firms such as Coopers & Lybrand, which drew its 57.9% increase in revenues from consulting and systems integration, are ideally positioned to capitalize on the downsizing that was amply evident in 1990. With computer-aided software engineering tools, outsourcing and back-office processing services, these firms are able to give clients what they need to save money and resources. "In tough economic times, people have some strong motivations to come to us," observes Gary S. Fernandes, senior vice president of Electronic Data Systems Corp., which saw revenue not related to its parent General Motors Corp. rise 16% in 1990. And by providing systems integration and custom programming, service firms can help clients build the kind of strategic systems they will need to prosper when the economy picks up again.

On Wall Street, for example, which had one of the worst years in its history in 1990, Salomon Brothers Inc., the big bond-trading house, remained committed to an ambitious five-year, $100 million plan for a trading room/back office network built on UNIX—a technology that has found minimal acceptance to date in the financial sector. At the same time, Salomon also inked a deal with Andersen Consulting to take over the job of maintaining its IBM systems.

For services firms, the main competition for market share will come from hardware manufacturers, as they try to recapture the business they've been losing to the likes of EDS and Andersen Consulting. And services firms are also feeling the hardware pinch. "Our margins on hardware are down," said Peter Sandiford of SHL Systemhouse Inc. "Our customers are looking at the hardware component and asking how they can do it cheaper themselves."

It's an axiom in business that decisions made when times are bad are the ones that dictate how good the good times will really be. Tough times for the vendor community can translate into more influence for the users. The pressures generated by the recession and by the user community's demand for truly cost-effective systems may, in the end, create a stronger and more responsive industry. □

Joseph Kelly is a contributing editor based in New York City.

In The Red

The companies that lost money.

	COMPANY	1990 EARNINGS LOSS ($ MIL.)
1	Wang	(665.4)
2	Unisys	(437.0)
3	Data General	(119.3)
4	Digital	(94.5)
5	Western Digital	(78.6)
6	Tektronix	(70.1)
7	MAI Systems	(64.5)
8	Concurrent	(60.0)
9	Texas Instruments	(39.0)
10	SHL	(35.0)

Big Exporters In North America

The North American companies with the most IS sales outside their home market.

COMPANY	NORTH AMERICA	EUROPE	ASIA PACIFIC	OTHER
IBM	26,165.1	26,836.0	9,392.6	4,696.3
Digital	5,621.1	5,490.4	1,830.1	130.7
Hewlett-Packard	4,185.0	3,534.0	1,581.0	0.0
NCR	2,134.5	1,966.0	1,179.6	337.0
Apple	3,329.2	1,607.2	746.2	57.4
Compaq	1,655.1	1,691.1	215.9	36.0
Xerox	1,400.0	980.0	140.0	280.0
Sun	1,381.4	828.9	552.6	0.0
Wang	1,157.9	756.2	449.0	0.0
Tandem	880.4	618.1	374.6	0.0

All revenue figures in millions.

THE DATAMATION 100

COVER STORY

Scorecards On The Best

IBM is tops in large-scale systems, midrange machines, PCs, peripherals, data communications, software and maintenance. It's third in workstations and sixth in services. Market share figures are based on the DATAMATION North American 100 market.

Large-Scale Systems

	COMPANY	REVENUE ($ MIL.) 1990	1989	% CHANGE	MARKET SHARE**
1	IBM	10632.0	12100.0*	-12.13%	73.58%
2	Amdahl	1360.0	1470.8	-7.53%	9.41%
3	Unisys	1016.0	1200.0	-15.33%	7.03%
4	Cray	590.2	633.6	-6.85%	4.08%
5	Control Data	265.0	465.0	-43.01%	1.83%
6	Convex	209.3	N/A	N/A	1.45%
7	Digital	185.0	N/A	N/A	1.28%
8	NCR	164.0	183.4	-10.58%	1.13%
9	Sequent	28.4	N/A	N/A	0.20%

*Restated figure
** Percentage share of DTM 100 revenues.

Midrange

	COMPANY	REVENUE ($ MIL.) 1990	1989	% CHANGE	MARKET SHARE**
1	IBM	5,801.0	4,136.0*	40.26%	41.40%
2	Digital	2,830.0	2,670.0	5.99%	20.20%
3	Unisys	1,100.0	1,122.0	-1.96%	7.85%
4	Tandem	770.0	709.6	8.51%	5.50%
5	Hewlett-Packard	732.0	750.0	-2.40%	5.22%
6	Prime	556.2	665.0*	-16.40%	3.97%
7	Wang	430.0	570.0	-24.56%	3.07%
8	NCR	428.0	475.0	-9.89%	3.05%
9	Stratus	403.9	310.1	30.25%	2.88%
10	Data General	204.3	245.9	-16.92%	1.46%

*Restated figure
** Percentage share of DTM 100 revenues.

Personal Computers

	COMPANY	REVENUE ($ MIL.) 1990	1989	% CHANGE	MARKET SHARE**
1	IBM	9,644.0	8,343.0	15.59%	37.66%
2	Apple	3,845.8	3,574.2	7.60%	15.02%
3	Compaq	3,598.0	2,876.1	25.10%	14.05%
4	Unisys	1,181.0	1,300.0	-9.15%	4.61%
5	Commodore	995.7	866.5	14.91%	3.89%
6	Intel	980.0	812.0	20.69%	3.83%
7	Tandy	850.3	689.1*	23.39%	3.32%
8	AT&T	700.0	700.0	0.00%	2.73%
9	Hewlett-Packard	625.0	850.0	-26.47%	2.44%
10	Dell	546.0	307.0	77.85%	2.13%

*Restated figure
** Percentage share of DTM 100 revenues.

Workstations

	COMPANY	REVENUE ($ MIL.) 1990	1989	% CHANGE	MARKET SHARE**
1	Sun	1,934.0	1,443.8	33.95%	27.11%
2	Digital	1,250.0	1,195.0	4.60%	17.52%
3	IBM	1,000.0	591.0	69.20%	14.02%
4	Hewlett-Packard	920.0	825.0	11.52%	12.89%
5	Silicon Graphics	414.6	291.6	42.18%	5.81%
6	Intergraph	344.7	260.0	32.58%	4.83%
7	Xerox	310.0	325.0	-4.62%	4.34%
8	Mentor	170.1	167.0*	1.89%	2.38%
9	Control Data	140.7	N/A	N/A	1.97%
10	Unisys	126.0	N/A	N/A	1.77%

*Restated figure
** Percentage share of DTM 100 revenues.

Software

	COMPANY	REVENUE ($ MIL.) 1990	1989	% CHANGE	MARKET SHARE**
1	IBM	9,952.0	8,424.0	18.14%	50.21%
2	Microsoft	1,323.0	820.8	61.18%	6.67%
3	Computer Associates	1,310.7	1,290.2	1.59%	6.61%
4	Digital	810.0	825.0	-1.82%	4.09%
5	Oracle	702.5	554.3	26.74%	3.54%
6	Lotus	634.5	516.0	22.97%	3.20%
7	Unisys	600.0	875.0	-31.43%	3.03%
8	D&B Software	539.0	450.0	19.78%	2.72%
9	WordPerfect	452.4	281.0	61.00%	2.28%
10	Novell	388.1	287.6	34.94%	1.96%

** Percentage share of DTM 100 revenues.

Peripherals

	COMPANY	REVENUE ($ MIL.) 1990	1989	% CHANGE	MARKET SHARE**
1	IBM	12,405.0	10,049.0	23.45%	33.42%
2	Hewlett-Packard	3,820.0	2,275.0	67.91%	10.29%
3	Digital	3,000.0	3,200.0	-6.25%	8.08%
4	Seagate	2,667.6	1,797.0	48.45%	7.19%
5	NCR	2,090.0	1,989.6	5.05%	5.63%
6	Apple	1,722.0	1,635.6	5.28%	4.64%
7	Conner Peripherals	1,337.5	704.9	89.74%	3.60%
8	Xerox	1,100.0	1,025.0	7.32%	2.96%
9	Unisys	1,100.0	1,039.0	5.87%	2.96%
10	StorageTek	815.0	710.5	14.71%	2.20%

** Percentage share of DTM 100 revenues.

Data Communications

	COMPANY	REVENUE ($ MIL.) 1990	1989	% CHANGE	MARKET SHARE**
1	IBM	2,950.0	3,000.0	-1.67%	34.49%
2	AT&T	1,465.0	1,445.0	1.38%	17.13%
3	Northern Telecom	1,220.0	1,150.0	6.09%	14.26%
4	Motorola	599.0	500.0	19.80%	7.00%
5	Unisys	425.0	375.0	13.33%	4.97%
6	Hewlett-Packard	400.0	500.0	-20.00%	4.68%
7	Xerox	380.0	400.0	-5.00%	4.44%
8	3Com	324.0	306.4*	5.74%	3.79%
9	Digital	275.0	225.0	22.22%	3.22%
10	Digital Communications	186.9	213.5	-12.46%	2.19%

* Restated figure
** Percentage share of DTM 100 revenues.

Services

	COMPANY	REVENUE ($ MIL.) 1990	1989	% CHANGE	MARKET SHARE**
1	EDS	2,870.0	2,477.9	15.82%	14.91%
2	TRW	1,739.0	1,565.0	11.12%	9.03%
3	ADP	1,730.0	1,689.5	2.40%	8.99%
4	CSC	1,679.3	1,442.8	16.39%	8.72%
5	Andersen Consulting	1,538.6	1,225.7	25.53%	7.99%
6	IBM	1,500.0	1,200.0	25.00%	7.79%
7	Digital	1,162.3	1,386.7	-16.18%	6.04%
8	Unisys	900.0	825.0	9.09%	4.67%
9	American Express	827.0	660.0	25.30%	4.30%
10	Black & Decker	692.1	687.6	0.65%	3.60%

** Percentage share of DTM 100 revenues.

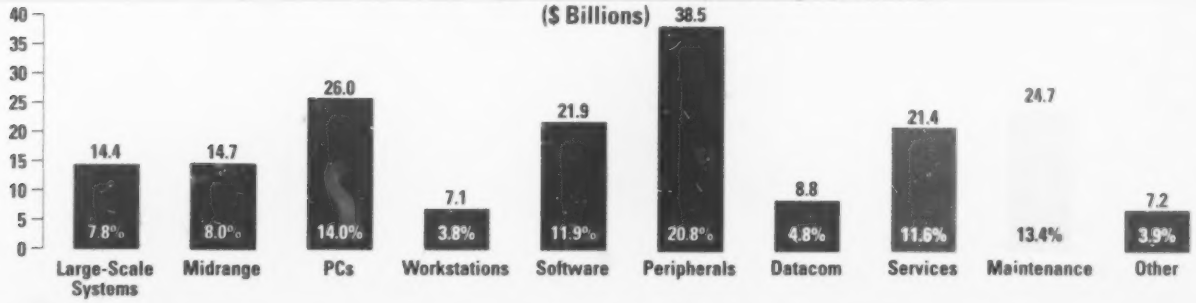
Maintenance

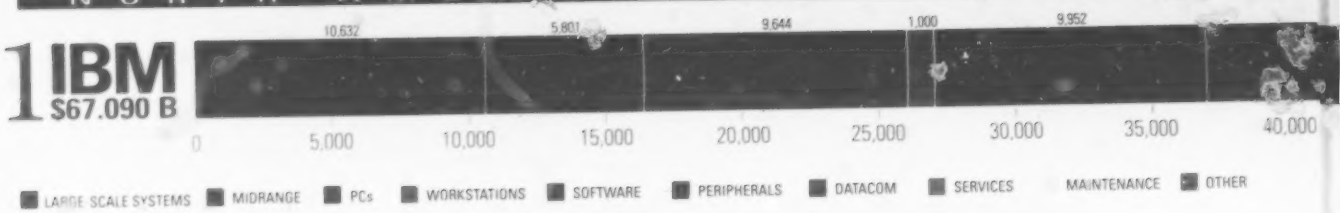
	COMPANY	REVENUE ($ MIL.) 1990	1989	% CHANGE	MARKET SHARE**
1	IBM	7,768.0	7,036.0	10.40%	33.21%
2	Digital	3,450.0	3,300.0	4.55%	14.75%
3	Hewlett-Packard	2,503.0	2,000.0	25.15%	10.70%
4	Unisys	1,990.0	1,947.0	2.21%	8.51%
5	NCR	1,770.0	1,647.0	7.47%	7.57%
6	Wang	994.0	994.0	0.00%	4.25%
7	Xerox	820.0	850.0	-3.53%	3.51%
8	Prime	635.6	563.0*	12.90%	2.72%
9	Data General	433.1	430.6	0.58%	1.85%
10	Amdahl	345.4	273.1	26.47%	1.48%

*Restated figure
** Percentage share of DTM 100 revenues.

Total Revenues By Category Of The DATAMATION North American 100

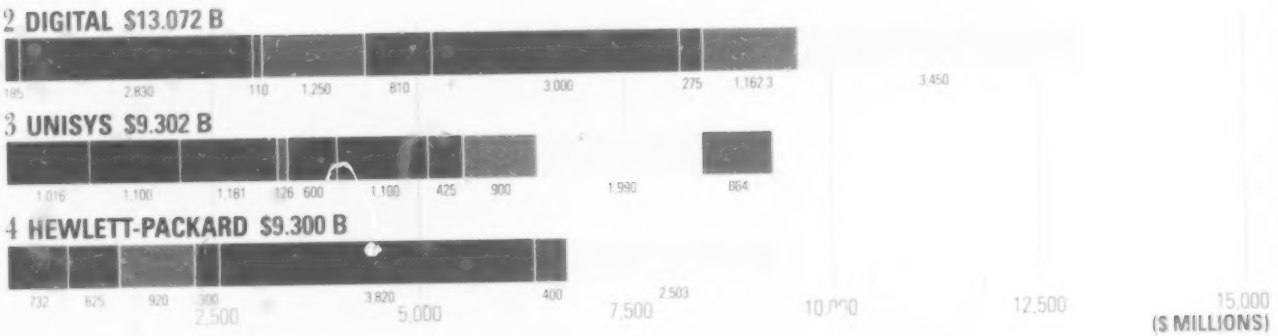
The following is a breakdown of the $184.7 billion North American revenues.
Included is the dollar figure, as well as the percentage of the total.

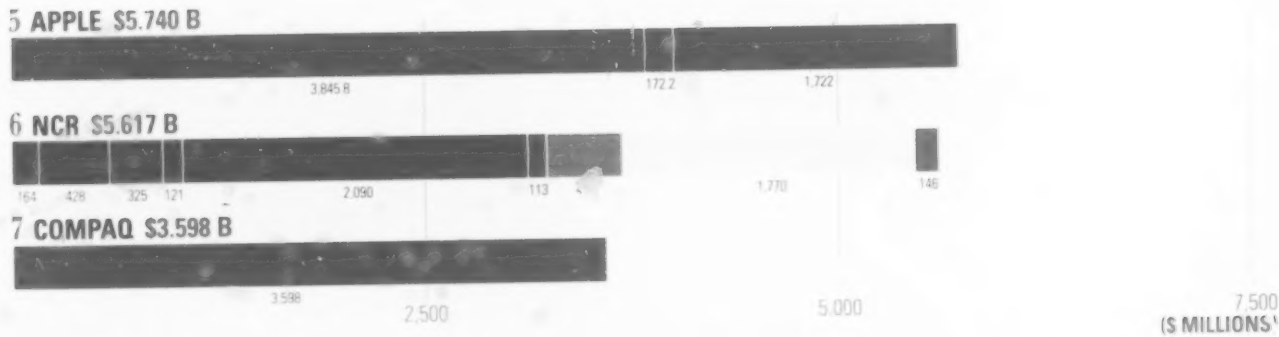


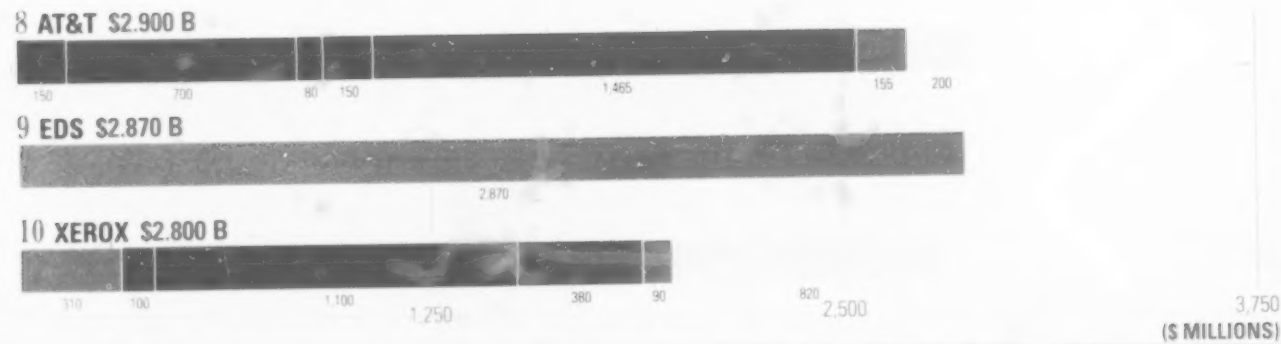


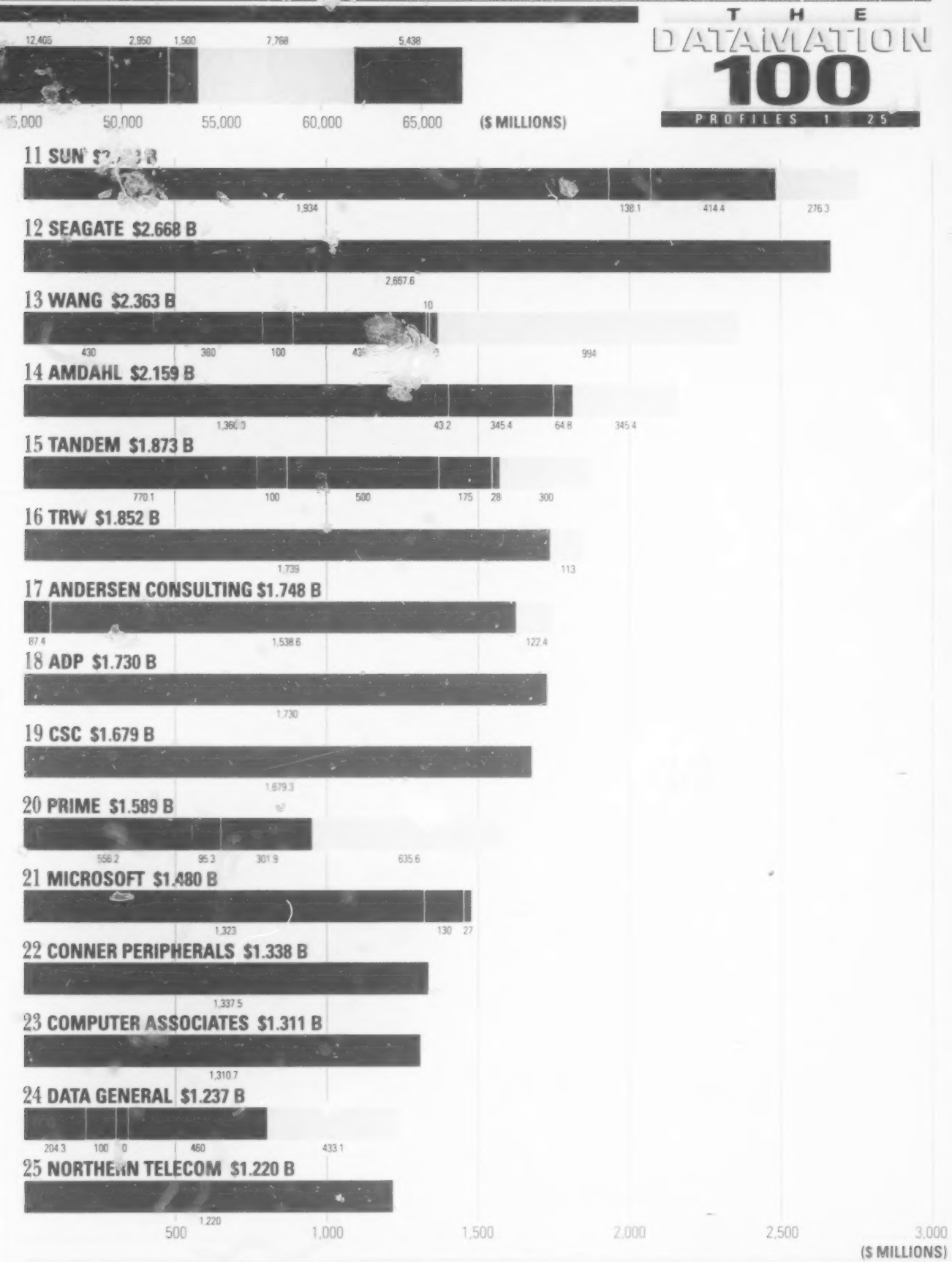
TOP 25

Conner Peripherals rockets 13 places, Wang and TRW drop three spots.
EDS breaks into the top 10, the top eight stand firm.





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15 TANDEM $1.873 B
770.1
100
500
175
28
300
16 TRW $1.852 B
1,739
113
17 ANDERSEN CONSULTING $1.748 B
87.4
1,538.6
122.4
18 ADP $1.730 B
1,730
19 CSC $1.679 B
1,679.3
20 PRIME $1.589 B
556.2
95.3
301.9
635.6
21 MICROSOFT $1.480 B
1,323
130
27
22 CONNER PERIPHERALS $1.338 B
1,337.5
23 COMPUTER ASSOCIATES $1.311 B
1,310.7
24 DATA GENERAL $1.237 B
204.3
100
0
460
433.1
25 NORTHERN TELECOM $1.220 B
1,220
500
1,000
1,500
2,000
2,500
3,000
($ MILLIONS)

INTERNATIONAL BUSINESS MACHINES CORP.

OLD ORCHARD ROAD
ARMONK, NY 10504
(914)-765-1900

RANK 1

IS REVENUE $67.09 B

Several years of cost cutting and new product development investments paid off for IBM in 1990. Even as many of its large competitors suffered from slowing growth and slimmer profits, the world's largest computer company saw revenues rise an impressive 10.3% to $69.02 billion. Revenue growth was almost twice what it was for IBM in 1989. Profits were up 60.2% to $6.02 billion. IBM's 1989 earnings were reduced by a $2.4 billion restructuring charge.

A revitalized software business helped propel IBM's better than expected 1990 financial results. Improved maintenance revenues also helped, as did an estimated 17% increase in revenue from systems integration and related support services. For the last few years, as part of its customer-driven marketing focus, IBM has been attempting to boost its services and software revenues. Software revenue, at about $10 billion in 1990, was up 18.1%.

"We said early in 1990 that we would have significantly improved financial results. We feel we delivered on that," says IBM treasurer Robert Ripp.

Thanks also to strength in its midrange and workstation businesses, IBM was able in 1990 to overcome a product transition-inspired lull in the large-processor portion of its business. IBM in September made what it called its most comprehensive product announcement in 25 years, the ES/9000, which extends the 370 mainframe into a future loosely coupled, distributed-processing architecture.

The largest versions of the ES/9000 won't be available until next quarter, however. As a result, some large customers put mainframe buying plans on hold. Revenue from IBM's largest water-cooled mainframes dropped by about 15%, according to estimates by Joseph Payne of Baltimore-based Alex. Brown & Sons Inc. Strong demand for air-cooled processors and flexible lease-financing options offered by IBM, however, helped smooth over the transition. Overall, the processor business grew just 1% to $16.4 billion. IBM officials predict better mainframe revenue growth in 1991, as the new ES/9000 hardware becomes available.

Meanwhile, IBM emerged as a rejuvenated vendor of midrange systems, improving what, through much of the 1980s, was a major weakness. Revenues from air-cooled processors—including air-cooled midrange ES/9000, AS/400 machines and the RS/6000 workstation, increased by 62.9% to about $5.7 billion, according to Alex. Brown estimates. The RS/6000 was surprisingly strong. IBM said it shipped 25,000 of the new RISC workstations, worth about $1 billion in revenue in 1990.

IBM's PS/2 revenue also continued to grow, at about a 10.6% clip for the year. In short, say observers, IBM emerged in 1990 with its most balanced product line in many years. "For the first time in 20 years, I've had a hard time coming up with a major weakness in IBM's major product lines," says analyst Bob Djurdjevic of Annex Research in Phoenix.

IBM accounted for 36% of the North American 100 revenue in both 1990 and 1989.

IBM's business in 1990 continued a gradual shift in focus to markets outside the United States. In fact, IBM's sales in Europe, which grew to about 39.5% of total revenues, caught up with IBM's sales in the States for the first time. Currency fluctuations accelerated the trend. But IBM officials also point to stronger fundamental economies in Europe and Asia.

In order to take advantage of faster non-U.S. growth, IBM made some organizational changes in 1990. For one thing, the company moved management of its Communications Systems line of business from Somers, N.Y., to Europe. And, while continuing to cut head count in the United States by about 10,000 in 1990, IBM held the number of employees in Europe steady.

But not for long.

Despite its strong showing in 1990, the ongoing recession and resulting restrained IS budgets at most user organizations cast a pall over IBM going into 1991. In March, IBM announced layoffs of 14,000 employees worldwide and shocked analysts by announcing that first-quarter 1991 earnings would be half what they were in the same quarter of 1990. Observers said that means it will be difficult for IBM to report any profit gain in 1991.

IBM officials maintain that its software and services businesses remain healthy despite the first-quarter downturn. They attribute the earnings slump to an across the board slump in IS spending and not to soft demand for any particular product line, including the ES/9000.

In fact, IBM officials say that through the rest of 1991 they will focus on a successful rollout of the new ES/9000 mainframes while continuing to cut costs. According to Treasurer Ripp: "Our projections are that we will finish 1991 at a lower head count. The question is going to be what happens with the economy in 1991."

IBM has planned for a slow first half of 1991 followed by recovery in the second half. Still, world economies are expected to grow slower as a whole this year than they did in 1990; some predict growth in gross national product of less than 1% in the United States and between 1 and 2% in Europe and Japan. According to Ripp that means "it's going to be hard to repeat a 10% revenue growth in 1991."

If the first quarter is any indication, that may prove to be an understatement.

—Jeff Moad

DIGITAL EQUIPMENT CORP.

146 MAIN STREET
MAYNARD, MA 01754
(508)-897-5111

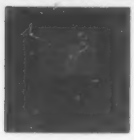
RANK 2

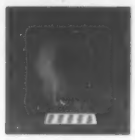
IS REVENUE $13.07 B

Digital Equipment Corp. was shaken by a year of major change in 1990. Revenues were flat, managing just a 1% increase from $12.93 billion at the end of 1989 to $13.07 billion in 1990, and all of that growth came from outside the United States.

Earnings took a fearful dive. In June, Digital posted its first-ever quarterly loss, of $256.7 million, after a $400 million restructuring charge. That loss shocked the financial community, as well as the computer industry. At the end of the year, after taxes and restructuring charges that totaled $550 million, Digital lost $94.5 million. Most of the restructuring charge stemmed from severance packages received by 2,550 employees who left via a voluntary departure program last year. Through the first involuntary departure program in its history, Digital will reduce its work force by another 2,500 to 3,500 people by June 30, the end of its 1991 fiscal year.

But compared with others of its ilk, Digital still looks pretty good; it has a low debt load and more than $1 billion in the bank. It's well positioned to change its product line as well as its marketing efforts, and it is doing so





with almost furious activity.

Digital is trying to become a company that specializes in integrated solutions, says senior vice president Winston R. Hindle Jr. Toward that end, Digital created numerous Integration Business Units last year, primarily focusing on vertical markets.

The company is making a push into software—most notably by creating the Software Products Group, which oversees the company's software research, development and licensing. Among the group's most important projects are attempts to revamp software licensing, the integration of Digital's Portable Operating System Interface for UNIX (POSIX) into the VMS kernel and further development of its Network Application Support (NAS) services. Digital may soon license NAS services to other vendors.

Despite the emphasis on software, however, the VAX architecture remains critical to Digital's strategy. The company shipped the first of its mainframe line, the VAX 9000, late in 1990, after a delay of some six to nine months. Technical problems plagued the line early on, causing the company to recall all of its processors and fix bugs. Now, however, Digital claims customers are happy with the product and says it had sold about 200 units by early this year.

Much of the $1.6 billion that Digital spent on research and development in 1990 went toward its Alpha project, a line of VAX systems based on internally developed reduced instruction set computing (RISC) technology. Although Digital's goal is to announce products in the first quarter of calendar 1992, analysts feel they won't be available until at least the end of 1992 due to problems getting the VMS operating system and VMS applications to run on them.

In calendar 1990, 57% of Digital's sales came from outside the United States. Strong areas included Japan, where the company hopes to realize almost $1 billion in revenue during calendar 1991. Eastern Europe is also attracting the company's attention. Digital made investments in Hungary last year and is opening a subsidiary in Prague, Czechoslovakia. Most significantly, Digital and Mannesmann AG formed Digital-Kienzle Computer Systeme GmbH & Co. KG, a joint venture that will sell systems to small and midsized businesses through value-added resellers. Digital owns 65% ($230 million) of the Villingen, Germany-based company.

The biggest challenge for Digital remains its ability to increase revenues and decrease costs in an uncertain economy. Says Digital's Hindle: "Clearly, the U.S. economy is the biggest question mark we have in front of us. And we have no idea when it's going to change."—*Elaine L. Appleton*

UNISYS CORP.

TOWNSHIPLINE AND UNION MEETING ROADS
BLUE BELL, PA 19424
(215)-986-4011

RANK 3
IS REVENUE $9.30 B

Can this company survive?

As unthinkable as this question might be for the third largest U.S. computer company, one with corporate revenues greater than $10 billion, it is one increasingly being asked in financial circles, as Unisys Corp., still burdened by a massive debt, struggles to regain profitability after losing more than $1 billion over a two-year period.

After spilling $639 million in red ink in 1989, Unisys stayed in the red in 1990—losing $437 million on flat revenues of $10 billion. Cognizant of its financial obligations, which include a $300 million installment (due this fall) on its $4 billion debt, Unisys entered 1991 in search of buyers for its nonstrategic assets.

"1990 was the year the chickens came home to roost on the merger in 1986," says George Lindamood, director of high-performance computing at the Gartner Group Inc. The Stamford, Conn.-based analyst is referring, of course, to the debt and the technological burdens Unisys assumed from the merger of the two companies that formed it—Burroughs Corp. and Sperry Corp. "The issue going into 1991 is: Can they turn their financial picture around? It's something they have to accomplish by the end of this year," says Lindamood.

"We know what we have to do," answers Everett M. Ehrlich, vice president for financial planning at Unisys. "Our goal is to reduce our debt by between $600 million and $800 million in 1991."

Unisys knocked about $200 million off its debt in 1990, taking such drastic action as eliminating its dividends to shareholders to free up cash for repaying loans. Unisys might have been able to reduce its debt further had the slump in the worldwide economy not sapped demand for its systems in the second half of 1990.

Not all the Unisys news in 1990 was bad, however. The company generated $44 million in operating profits for the year (what dragged down earnings was the nearly $450 million in debt-related interest expenses). With its InfoImage line of products, the company emerged as a leading supplier of image-processing systems, winning orders from the likes of Signet Bank NA and The Chase Manhattan Bank. And it unveiled the Unisys Architecture—a technology blueprint for Unisys's customers to follow in the 1990s.

These efforts are leading many large customers to stick with Unisys. "Most people are more concerned with what is being delivered and what's in the pipeline" than with the company's financial woes, says Tim Hind, president of the CUBE Inc. Unisys user group.

In 1991, Unisys is continuing to try to raise cash, cut expenses and focus on key products and markets. The company expects to raise between $1 billion and $2 billion in cash through the sale of assets, although it won't identify which assets are on the block. Securities analysts speculate that the company's Timeplex data communications unit and its interest in Nihon Unisys, one of Japan's largest computer companies, may be up for sale. It plans to have eliminated another 5,000 of its 75,000 jobs during the first half of the year. And it intends to focus on UNIX-based client/server technologies; image applications; and key customer segments like the telecommunications, airlines and financial services industries.—*Jeff Moad*

HEWLETT-PACKARD CO.

3000 HANOVER STREET
PALO ALTO, CA 94304
(415)-857-1501

RANK 4
IS REVENUE $9.30 B

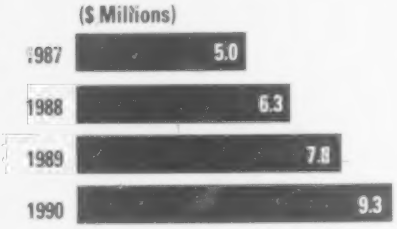
"Nineteen-ninety was supposed to be the year of the 68040," says Willem P. Roelandts, vice president of Hewlett-Packard Co.'s Networked Systems Division, referring to the Motorola Inc. microprocessor around which HP had built so many of its product plans for the year. Instead, 1990 revolved around a number of successes in product areas other than workstations, where delays in 68040 shipments cost the company market share and momentum.

HP's worldwide revenues from all its businesses—computers, test and measurement (T&M) equipment, medical products, etc.—expanded 10% to $13.2 billion in 1990 for the 12-month period that ended on October 31 of last year. Geographically, much of the growth came from overseas. HP generated nearly 55% of its business in Asia and Europe. In fact, Europe is so important to HP that it chose last year to relocate its worldwide PC operations there. The company kept its technological lead in the printer field by virtue of products like the LaserJet III and HP desktop laser printers. Additionally, the company got a big boost from servicing all of the midrange systems it installed during the 1980s and into 1990.

Still, HP's performance could have been better. Its systems business—where the company lumps T&M products in with its 9000 and 3000 series of midrange and workstation systems—only expanded 5% to $4.9 billion in 1990. Dean Morton, the company's chief operating officer, insists that if HP had chosen to break out sales of midrange systems separately, observers would have seen 60% growth in its UNIX-based products and respectable expansion of its proprietary MPE-based line. If Motorola had been able to deliver quantities of its 32-bit 68040 chip on time, HP executives contend, the systems group would have sold a lot more workstations—enough, perhaps, to eclipse Sun Microsystems Inc. as the workstation market leader and to cover the company's rising costs.

Those costs wreaked havoc with HP's bottom line, which plunged 11% in 1990 to $739 million. The costs reflect the shift in HP's product mix toward more products sold through indirect channels. HP was forced to give substantial discounts to the dealers, resellers and original equipment manufacturers (OEMs), who together generate 60% of HP's computer sales. That raised its cost of goods sold to nearly 53% of corporate revenues.

HP's IS revenue has grown 86% since 1987.



The distribution channel issue factored heavily in the reorganization of HP's computer businesses, that occurred in October. The change left Lewis E. Platt in charge of HP's Computer Systems Organization, overseeing Roelandts and other executives charged with developing and selling midrange systems and workstations—products best suited for direct sales channels. Platt's counterpart, Richard A. Hackborn, heads up HP's Computer Products Organization, championing the company's leading-edge PCs and phenomenally successful peripherals—goods that move through resellers.

HP struck several alliances with major suppliers in 1990. The firm bought 10% of Informix Software Inc., its second relational database software partner. HP will team up with Sun to jointly develop object-oriented software technology. Hitachi Ltd. has decided to collaborate on developing expert systems applications. Computer Associates International Inc. will develop UNIX-based applications for HP's systems.—*Tim Mead*

APPLE COMPUTER INC.

20525 MARIANI AVENUE
CUPERTINO, CA 95014
(408)-996-1010

RANK 5
IS REVENUE $5.74 B

Apparently, it's not impossible to turn on a dime if you're a $5.7 billion company. Just look at what Apple Computer Inc. did in 1990. It began the year with mostly a high-end product set marketed by a former IS chief aimed squarely at information systems shops in big organizations. It ended 1990 with a suite of low-end products targeted straight for mass markets and honchoed by a professional marketer who cut his teeth in Europe.

Apple's new direction is paying off on the top revenue line but raising questions about its impact on the bottom profit line. Revenues for the company expanded 12% in the fourth quarter of 1990, following the introduction of three low-cost Macintosh systems in October. For the year, Apple's sales expanded almost 7% from $5.37 billion to $5.74 billion. In the first quarter of 1991, when the new Macs shipped in greater volume, earnings were flat at $131 million, despite an 18% jump in sales over the same period of 1990.

"We know the high-volume, low-cost pricing strategy will affect bottom-line performance," says Joseph Graziano, Apple's executive vice president and chief financial officer. "There's no question we're changing our economic business model."

The new model is designed to gain market share, pure and simple. The master of the model remains John Sculley, chairman and chief executive officer of Apple. But he's got a powerful new ally in Michael E. Spindler, who had headed up Apple's European operations prior to being elevated to president and chief operating officer for all of Apple. Gone from Apple's core management team is Allan Loren, who arrived at Apple in 1987 as its IS chief and worked his way up to become president of Apple USA in 1988. Gone, too, is the individual who oversaw development of many of the products Loren took to the corporate IS market—Jean Louis Gassée, who resigned as head of Apple Products.

The chief product components of the model are the three new low-end machines—Mac Classic, Mac LC and Mac IIsi, ranging in price from $1,060 to $2,625—and the high-end systems developed on the Loren/Gassée watch—Mac IIci and Mac IIfx, priced between $5,300 and $7,400.

The economics of the new model require Apple to reduce sales and marketing expenses, Graziano says. Research and development will be spared Apple's Slim-Fast program, with R&D outlays earmarked at 9% of revenues in 1991.

One outcome of Apple's research efforts should be visible soon—a new operating system (7.0) for its Macintosh machines. Nobody is certain, however, whether it will arrive in time to thwart any defections in the corporate IS community to Macintosh's chief rival, the IBM-compatible personal computers shipping with Microsoft Inc.'s highly successful Windows 3.0 graphical user interface software.

Other byproducts of Apple's R&D efforts that should surface in 1991 are a high-end machine based on Motorola Inc.'s 68040 32-bit microprocessor and a notebook PC being developed with Sony Corp. "The business market is very important to the company, and Apple still needs to be successful there," Graziano says, referring to the company's 68040 product plans. "We've been weak in the portable and laptop markets, and we're looking to improve that," he says of Apple's notebook initiative.—*John McMullen*

NCR CORP.

1700 SOUTH PATTERSON BOULEVARD
DAYTON, OH 45479
(513)-445-5000

RANK 6
IS REVENUE $5.62 B

It was a case of good news and bad news in 1990 for NCR Corp.

On the positive side of the ledger, NCR successfully pulled off a large and complicated new product strategy and product statement—its Open Cooperative Computing Architecture (OCCA). And while attempting to make the difficult transition from proprietary mainframe systems to open, standards-based products, NCR managed to sustain revenue growth, even in the face of the recession. The company reported an almost 6% jump in revenue for the year to $6.18 billion. Net income, at $369 million, was down 10%, largely because of lower profit margins resulting from development and marketing of the new products.

On the negative side—at least from the point of view of NCR's management—OCCA's success helped attract a $5.9 billion

hostile takeover bid from AT&T. While some NCR officials insisted that the AT&T bid did nothing to reduce customer orders or confidence, NCR chairman and chief executive officer Charles E. Exley Jr. personally took on the challenge of fighting off the AT&T bid as if it were a bad case of the flu. And many analysts concurred that a takeover of NCR by AT&T, which has been profoundly unsuccessful in the computer business, would be the kiss of death.

"Anybody who's any good will leave NCR," says analyst Peter Labe of Labe, Simpson & Co. Inc., based in New York City. "AT&T will destroy it." Likewise, some NCR customers were unenthusiastic. "History has shown that this kind of merger doesn't work," says Roger D. Wohler, data-processing manager for the Kansas State University Foundation in Manhattan, Kan. In May, AT&T upped its offer to $7.84 billion which Exley found he couldn't refuse. At press time NCR had agreed to the AT&T takeover.

Despite the takeover threat, NCR reported strong customer interest through 1990, in its OCCA products, the most impressive being a broad family of Intel- and UNIX-based multiprocessors and loosely coupled systems called System 3000. Other OCCA products include Open Systems Interconnect-based networking software and object-oriented software based on a graphical user interface.

The Kansas State University Foundation was among the first to order a 3450 multiprocessor system, which will replace an NCR 9300 mainframe. NCR also received early orders for System 3000 products from retailers K mart Corp. and Wal-Mart Stores Inc. and from communications companies Bell Canada and BellSouth Corp. Among the beta sites for OCCA software were Chemical Bank and Citicorp.

NCR officials say they expect moderate growth in both sales and earnings in 1991, despite continuing margin pressures and the ongoing recession at least through the first half of the year. As in 1990, most of the company's revenue growth will come from outside the United States, according to senior vice president for finance and administration John L. Giering. In 1990, international revenue for NCR increased 11%, whereas U.S. revenue fell 2%.

Continued pressure on margins will come from higher marketing and research and development expenses, as NCR continues to develop and sell the OCCA products. R&D spending grew from NCR's historic 6+% levels to about 8% of sales in 1990. Marketing expenses rose 6.5% for the year. Giering, however, predicts that profit margins will improve late in the year as NCR begins to ship its large loosely coupled 3600 systems and more OCCA software.

Analyst Labe says 1991 will be another low-growth transition year for NCR. "But in 1992 and 1993, you ought to see this tree blossom, if it is allowed to," he says.—*Jeff Moad*

COMPAQ COMPUTER CORP.

20555 STATE HIGHWAY 249
HOUSTON, TX 77070
(713)-370-0670

RANK 7
IS REVENUE $3.60 B

For a company that traces its origins back to a discussion in a late night Texas coffee shop, Compaq Computer Corp. has been anything but provincial in its outlook—or in its revenues. Compaq's sales now spout primarily (54%) from the international side, with the other 46% coming from the United States.

That strong overseas showing has served the company well. Considering that much of the PC industry was stagnant last year, Compaq—which reported sales increases of 25%—looked strong. And much of that strength is due to the company's firm footing overseas.

Compaq's European success was largely under the purview of Eckhard Pfeiffer, who headed up the company's European operation until January 1991. That's when he became chief operating officer, taking on many of the duties of departing Michael S. Swavely, former president of U.S. operations. In Compaq's consensus management style, it's difficult to determine the impact of individual executives, but it's likely Pfeiffer will make his mark down the road. Chief executive Rod Canion, for instance, plans to concentrate more on long-range plans for the company.

Shortly after Pfeiffer was named to his new post, the company shored up its service and support offerings by opening up a telephone support line and offering various service packages through dealers—something many analysts said was long overdue. Although these changes reportedly were planned prior to Pfeiffer's arrival, the company used its European support operation as a model. Pfeiffer says its success can be attributed to Compaq's decision to be selective in choosing European dealers. "Early on, we emphasized strong country organizations in Europe. And that paid off because we were able to sign up strong dealers," Pfeiffer says.

European users seem to relish the extra attention. According to Dan Jacobson, data-processing manager at Norway's Kommunes Centralfordunde, a municipal government agency in Oslo, Compaq's reputation for support was one factor leading to his recent migration from an IBM AS/400 midrange machine to a Compaq SystemPRO. "If it's a minor problem, we go to our dealer, but if it a major problem we can go to them [Compaq]," says Jacobson.

Although it's not been without some stumbles, the company has done fairly well with the SystemPRO, its initial server. Sales of the dual-processor machine reached $200 million in 1990, Pfeiffer says. Last year's real superstar, however, was Compaq's diminutive LTE notebook computer family. Demand overran supply throughout 1990, a situation Compaq hopes to resolve by summer.

The notebook PC field has since attracted a host of competitors, many of them offering lower cost products than Compaq. Nevertheless, analysts aren't worried; they think that Compaq's reputation for quality and innovation will keep it in the forefront. Says analyst Mark Stahlman at New York City-based Alex. Brown & Sons Inc. "Compaq is still able to leapfrog its competitors in portable products, and that's key in this market."

Not bad for a cup of coffee.—*Bob Francis*

AMERICAN TELEPHONE AND TELEGRAPH CO.

550 MADISON AVENUE
NEW YORK, NY 10022
(212)-605-5500

RANK 8
IS REVENUE $2.90 B

AT&T was the talk of the industry in 1990, as the company moved to acquire NCR Corp. The hostile takeover attempt overshadowed what would have been significant developments in any other year for the communications giant's commercial information systems arm, the AT&T Computer Systems Group, headquartered in Morristown, N.J.

Here are just some of the highlights of the group's product rollout:

- A UNIX-based LAN Manager/X network operating environment, a complete rewrite of Microsoft Corp.'s LAN Manager.
- An office automation software package called Rhapsody. Using it, a customer can choose his or her own word-processing, spreadsheet and other standard applications but work within a Rhapsody framework rich with features like global messaging and document management.
- A network server, dubbed StarServer E, that brings together a computer operating system (UNIX System V release 4) and a network operating system (LAN Manager) on a symmetric-multiprocessing

machine built with 80486 microprocessors.

• A UNIX-based database server, made by Pyramid Technology Corp. and marketed by AT&T as the System 7000. It's based on reduced instruction set computing (RISC) architecture.

• A RISC chip upgrade to AT&T's established line of 3B2 midrange systems. Upgrading the systems with Mips Computer Systems Inc.'s R3000 RISC chips doubled the 3B2's price/performance ratio over previous models.

Although 1990 was a busy year on the product side, it was another year of red ink in the accounting department. AT&T does not disclose its Computer Systems Group revenues, but analysts estimate that the firm lost $300 million, in the computer business last year.

Despite losing money in computers, AT&T won some big customers in 1990. United Parcel Service ordered $29 million worth of networked PCs from AT&T. National Railroad Passenger Corp. signed a $14 million contract with the company to install and maintain 2,100 networked computers at 300 Amtrak stations. AMR Corp.'s American Airlines Inc. subsidiary tapped AT&T for a multimillion-dollar extension to its Semi-Automated Business Reservation Environment (SABRE) reservation system. AT&T also scored multiple wins in the hotel industry.

Clearly, however, AT&T has opted to buy its way out of the loss column in computers. Although AT&T continues to develop its own products for introduction in 1991 and beyond, its chief product strategy is to buy NCR. If its takeover of NCR is successful, (NCR has agreed in principle) AT&T intends to leave much of the Dayton, Ohio, company's computer and software lines intact, says AT&T vice president William T. O'Shea.

Both AT&T's 3B2 and NCR's Tower lines of UNIX servers and midrange systems will stay. So will AT&T's System 7000 and StarServer FT, the latter a fault tolerant machine made by Tandem Computers Inc. that AT&T remarkets. The StarServer E, however, is likely to displace comparable models in NCR's 3000 line.

On the software side, AT&T's Tuxedo monitor looks like the overall winner for transaction-processing applications. Rhapsody and NCR's Cooperation software each has its strong suits, O'Shea says, suggesting that the two products may be merged.—*Mark Schlack*

Electronic Data Systems Corp.

7171 Forest Lane
Dallas, TX 75230
(214)-661-6000

RANK 9
IS REVENUE $2.87 B

In 1990, Electronic Data Systems Corp. swung for a home run but settled for a solid double down the line.

One of the leading providers of outsourcing and systems integration services put together a pair of deals that—had they survived—would have given EDS both an immediate bottom line boost and direct participation in two key new markets: insurance and air transportation. The most significant deal was one for EDS to buy 50% of Continental Airlines Holdings Inc.'s System One computerized reservation system and to provide data services for the system for 10 years. EDS valued the agreement at up to $4 billion.

The second deal would have given EDS a similar 50% ownership of insurance holding company Westwood Equities and a $250 million, 10-year outsourcing contract with its Ticor Title subsidiary.

The Westwood deal, however, fell through, and the Continental purchase went into suspended animation when the air carrier filed for protection under Chapter 11 of the Federal Bankruptcy Act. So those two major contracts produced little more than legal bills for EDS in 1990. This year, however, EDS did conclude the outsourcing part of the Continental deal, valued at $2.1 billion.

And the company managed to produce solid revenue and earnings gains in 1990, particularly in that part of the business not dependent on parent General Motors Corp. Non-GM revenue was up by about 16.7% in 1990 to $2.87 billion, while GM-related business grew 7.56% to $3.01 billion. Overall earnings grew by 14.2% to $496.9 million.

EDS senior vice president Gary J. Fernandes attributes the non-GM revenue increase to EDS's ability to gain customers in new markets, grow business outside the United States and weather the recession by convincing customers to outsource IS services as a way to save money. "In tough economic times, people have some strong motivations to come to us. That's what's been happening," says Fernandes.

The company gained ground in unfamiliar markets, inking an outsourcing contract with Lockheed Space Operations Corp. to operate a data center at the Kennedy Space Center. EDS also linked up with food services firm Morrison Inc.

IS international business grew from 15 to 18% of revenues in 1990. Fernandes calls that figure "still far too low," but says that the company continues to invest in international networks and data centers that should lay the groundwork for future international business growth. In 1990, EDS did sign a new $300 million outsourcing agreement with Saab-Scania AB and service agreements with the U.K.-based Midland Bank PLC and Bancomext SA in Mexico.

Although EDS posted healthy revenue figures, non-GM growth of 16.7% was down radically from the 32% the company reported in 1989. Analyst Doug Wilder of Mountain View, Calif.-based Input Inc. attributes the dip in part to increased systems integration and outsourcing competition from formidable new market entrants such as Andersen Consulting and IBM. Wilder notes that those competitors, unlike EDS, have had strong international operations for many years.

Fernandes acknowledges that EDS is facing increasing competition for outsourcing and systems integration revenue. But, he says, EDS management still expects to grow its non-GM revenues by at least 18% in 1991.—*Jeff Moad*

Xerox Corp.

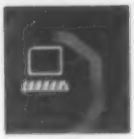
800 Long Ridge Road
Stamford, CT 06904
(203)-968-3000

RANK 10
IS REVENUE $2.80 B

For years, Xerox Corp. has copied its own success, over and over again. But, like copies, over the years Xerox's success with its mature technology has been fading.

For the past few years, Xerox has been trying to change its image to that of a "document company" in order to broaden its appeal within the information technology industry. To date, it hasn't been very successful. Despite modest gains of 9.7% in document-processing revenues to $13.6 billion from $12.4 billion in 1989, overall earnings in 1990 dropped 65% from the year before.

The amount of that revenue that's IS related remained the same as it was last year, at $2.8 billion. Earnings from document processing were $599 million in 1990, up 23% from $488 million in 1989. The company's revenues as a whole, however, grew only 4.7% from $17.2 billion in 1989 to $18.0 billion last year, as document-processing growth was offset by extremely poor performance in Xerox's financial services businesses.



In March, Xerox wrote off $375 million when it discontinued VMS Realty Partners, its troubled real estate business. Later in the year, it also sold its ailing auto insurance operations to a subsidiary of General Motors Corp. And, although it also sold its South Pacific document-processing operations to joint venture Fuji Xerox Co. Ltd. for a total of $410 million, the company will continue to focus on document processing: copiers; printers; workstations; and so-called collaborative-publishing software, which enhances the ability of teams of authors to work on one document.

To revitalize the company, president and chief executive officer Paul A. Allaire, who took over from eight-year veteran CEO David Kearns in August, is furthering Xerox's efforts to change its image with an aggressive product development campaign. In October, Xerox announced the first in a series of multifunction printers, the Docutech Production Publisher—the company's most significant and expensive product announcement in years. Some analysts speculate that Xerox, known to spend $800 million a year on research and development, may have spent $1 billion in R&D to build Docutech.

Along with the new $220,000 do-everything machine, which combines printer, copier and scanning technology, went a stepped-up advertising campaign designed to reposition the company. The added exposure reaped some benefits by the fourth quarter, in which document-processing revenues were up 9% over the same period in 1989.

In July, Xerox signed a $200 million contract to resell Sun Microsystems Inc.'s SPARC-based computers, in an expected move that acknowledged the failure last year of its own proprietary workstations to gain significant market share. And although it won't say when, Xerox will port its software to platforms other than Sun's sometime in the near future.

The Sun deal followed a series of smaller software agreements in which Xerox shed some technology and picked up other products. In February, Computer Associates International Inc. assumed the rights to Xerox Presents and Xerox Graph software, an option CA gained when it acquired Cricket Software Inc. from Xerox in June 1989. In March, subsidiary Xerox Desktop Software Inc. acquired Ventura Software Inc. of Salinas, Calif.; the following month, it signed a deal with Digital Research Inc. to license DRI's GEM windowing environment.

Those agreements were only the beginning of what William C. Lowe, executive vice president in charge of development and manufacturing, says will be a continuing challenge in 1991: opening up Xerox technology and partnering with other companies. In October, Xerox announced partnerships with a raft of companies, including Adobe Systems Inc., Andersen Consulting, AT&T, Digital Equipment Corp., Ernst & Young, Novell Inc. and Unisys Corp.

Perhaps the most significant of those partnerships is with Novell. Sometime this year, Xerox will come out with a version of Docutech that connects to PCs, Apple Macintoshes and workstations via Novell NetWare-based local area networks. That interconnected product will be one of many new products in 1990 and 1991, the hoped-for results of closer ties between Xerox's Palo Alto Research Center (PARC) and Xerox's product managers. Xerox has tightened these relationships over the last two years, says Lowe, "in order to, frankly, get the technology out of PARC, out of research and into our customers' hands faster."

—Elaine L. Appleton

SUN MICROSYSTEMS INC.

2550 GARCIA AVENUE
MOUNTAIN VIEW, CA 94043
(415)-960-1300

RANK 11
IS REVENUE $2.76 B

The phenomenal success enjoyed by Sun Microsystems Inc. in 1990 belies the challenges ahead of the nine-year-old company. There's little time at Sun these days to gloat over what by every conceivable measure was an outstanding performance last year. Earnings tripled to $151 million. Revenues expanded more than a third to $2.76 billion on the strength of Sun's all-wood-behind-one-arrowhead strategy—focusing on a single architecture, operating system, network standard and graphical interface.

What's keeping Sun from properly enjoying such triumphs is competition in technology and marketing. In computing horsepower, Sun's family of Scalable Processor Architecture (SPARC) products are threatened in price and performance by several other products based on reduced instruction set computing (RISC) designs—notably IBM's RS/6000 workstations, Hewlett-Packard Co.'s new HP-PA line of workstations and Mips Computer Systems Inc.'s Sun-compatibles. In marketing, Sun faces three broad challenges. One is to combat the sheer force of IBM, HP and Digital Equipment Corp. (one of Mips's customers). Another is to fight the image that Sun no longer sells open (standards-based) systems. Yet another is to stop personal computer suppliers from taking the high ground in client/server computing.

"The Big Lie. That's what I call all of this nonsense about being a proprietary systems supplier," says chief executive officer Scott G. McNealy, refuting charges that Sun's refusal to back technologies endorsed by the Open Software Foundation is tantamount to being closed minded. "Just because I won't pay taxes to IBM, HP and DEC [OSF's main U.S. constituents]—that's why I'm not open?" the CEO asks in visible disgust. Volume shipments and a willingness to license technology is what creates a standards setter, he argues.

Sun last year sold nearly 150,000 systems itself—the basis for McNealy's claim that the company's SPARC design captured 70% of the market for all RISC-type chip shipments in 1990. SPARC licensees, such as Solbourne Computer Inc. and Toshiba Corp., contributed little to Sun's RISC battle last year, but they and the two dozen other SPARC licensees are expected to become a bigger factor this year in holding off IBM, HP, Mips and others.

The bulk of Sun's revenues in 1990 came from its SPARCstations, whose low-end models (the SLC at $4,995, the IPC at $7,995 and the 2 at $14,995) compete more than effectively in performance against high-end personal computers, especially now that popular PC-based software packages like Lotus 1-2-3 are available for them. But more and more sales are also coming from the company's SPARCservers. McNealy estimates as much as $1 billion of Sun's 1991 revenues are coming from server-class machines.

The closest Sun comes to disclosing (in dollar terms) its customer segments and channels for reaching them is to say that half of the company's sales in 1990 stemmed directly from users and half came from resellers. Among its more important resellers are these DATAMATION 100 members: Intergraph Corp., Mentor Graphics Corp. and Mitsubishi Corp. Last year, all signed multiyear contracts valued at $150 million or more to resell SPARC systems with their own software.

One commercial avenue where Sun's systems continue to land is Wall Street. Bear, Stearns & Co. Inc., which began installing the company's workstations as long ago as 1987, remains bullish on Sun. But the senior managing director of information services for the brokerage firm is quick to add: "I don't care whose machine it is. As long as it is AT&T UNIX-compliant, I'll buy it."

Mindful of the challenges of winning and maintaining customers like Bear Stearns, McNealy has created a new corporate organization for managing his company's increasingly complex business. Effective in two

weeks, customers of Sun will see three spheres instead of one. SunSoft Inc. will license operating system software and other system software products to resellers. SunTech Enterprises Inc. will make and market to resellers and users tools, networking software, peripherals and other add-on products for Sun's and the SPARC licensees' platforms. Sun Microsystems Inc. will develop, make and market SPARCstations and SPARCservers to all types of customers.

"We broke a little glass," is how McNealy describes his new organization, which broke down some existing structures within his company. Whether the new Sun is as smashing a success as the old one depends on how well it meets the hurdles placed in its way by technology and competition.—*Tim Mead*

Seagate Technology Inc.

920 Disc Drive
Scotts Valley, CA 95067
(408)-438-6550

RANK 12
IS REVENUE $2.67 B

A strategy emphasizing production efficiencies over innovative technologies made Seagate Technology a success in the 1980s. But it cost the largest independent disk drive manufacturer in the first year of the 1990s.

Although Seagate Technology's revenues last year expanded nearly 50% to nearly $2.67 billion, much of the gain came from an acquisition, rather than internally generated growth. (A full year's worth of financial results from the Imprimis Technology Inc. disk drive business acquired in 1989 from Control Data Corp. landed on Seagate's balance sheet in 1990.) Eclipsing Seagate's performance were innovative upstarts Conner Peripherals Inc. and Quantum Corp. Conner Peripherals's revenues expanded 90% to $1.34 billion last year, and Quantum's revenues rose 82% to $716 million. These successes were largely the result of the two companies' pioneering efforts in new 3½- and 2½-inch drive formats for storing information.

Seagate could not follow its two rivals quickly enough in the race to win disk drive orders from portable, notebook and other PC makers that preferred drives smaller than 5¼ inches, the company's traditional forte. As a result, net income at Seagate fell roughly 5% to just under $100 million in 1990. Now, however, Seagate is working hard at becoming a technology leader instead of a follower.

In 1990, Seagate introduced a barrage of new products, including additional 3½-inch drives, the company's first 2½-inch product and new high-capacity 5¼-inch drives. Seagate also entered into alliances with Cray Research Inc. and NCR Corp. to build high-performance storage devices with greater capacities and data transfer rates. Cray is already marketing a proprietary version of one of those products with its supercomputers, and NCR is incorporating an integrated disk array into several of its systems.

Seagate's efforts in high-capacity drives are based on Imprimis's technology. Seagate is both the market and technology leader in disk drives holding over 1 gigabyte of information, claims Garrett A. Garettson, the company's vice president for product strategy.

However, at lower levels of storage, Seagate lags. Both Conner Peripherals and Quantum were well ahead of Seagate in shipping their first 2½-inch drives. In this area, Seagate also faces competition from new entrants such as Maxtor Corp. and Western Digital Corp., as well as an expected onslaught from Japanese manufacturers. Toshiba Corp. announced its first 2½-inch drive in September. Meanwhile, margins in the 3½-inch market are becoming razor thin. Prices on 40-megabyte 3½-inch drives fell some 36% to below $200 last year, according to analysts who follow the market.

Seagate must achieve greater marketing success for its technology efforts to pay off. The company will need to win contracts to supply drives to high-flying computer manufacturers and also maintain the sizable business with IBM that it already enjoys. Seagate's two biggest competitors are riding high fliers, with Conner Peripherals aboard Compaq Computer Corp. and Quantum atop Apple Computer Inc.—*Joe Kelly*

Peripheral revenue from the top 100 North American companies grew 18.9% in 1990.

Wang Laboratories Inc.

1 Industrial Avenue
Lowell, MA 01851
(508)-459-5000

RANK 13
IS REVENUE $2.36 B

Rare is the company that can lose $665 million in a single year and argue convincingly that its health has improved. Wang Laboratories Inc. belongs to that rare breed, although its prospects for survival are hardly assured.

The company last year cleaned up its balance sheet, satisfying bankers and brokers vexed by Wang's past borrowing practices and its overhead costs. It continued to bring in new management, restoring a level of competence to its executive ranks that had been absent for years. And it began to deliver standards-based products, carrying out its open systems promises.

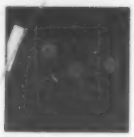
What Wang didn't do in 1990, however, was attract a significant number of new customers or stem all defections from its existing customer ranks. One-third of Wang's customers surveyed by DATAMATION and Cowen & Co. last fall indicated they were considering a switch to a new midrange systems supplier.

In the absence of both new accounts and absolute fidelity among existing users, Wang's revenues declined around 12% from $2.70 billion in 1989 to $2.36 billion in 1990. The company's losses, meanwhile, widened from $511 million to $665 million—mostly due to restructuring costs incurred during the first half of 1990.

But in the second half, Wang's losses shrank to $22.1 million. And besides almost stanching the flow of red ink, Wang ended 1990 with a much stronger asset base, having $100 million more in cash on hand and a $100 million less in accounts receivable than in the previous year. Moreover, its operating costs were down almost $500 million on an annualized basis, mostly due to the head count reductions. The ranks of Wang employees shrunk from 29,000 to 20,184 between 1989 and 1990.

It's the product set, not balance sheet, that will prove Wang's doing or undoing in 1991. Chief executive officer Richard Miller; executive vice president and Unisys Corp. veteran Joseph Tucci; and the other half-dozen executives plucked from competitors Control Data Corp., Digital Equipment Corp., Hewlett-Packard Co. and elsewhere are going to have to deliver on promises made to users that Wang can transform itself from a maker of proprietary minicomputers to a supplier of PCs, workstations, networks, servers and software that comply with industry standards.

To date, most of Wang's standards strategy has revolved around hardware built atop the Intel Corp. 80X86 PC/server architecture and software linked to other companies' popular platforms. In mid-1990, for example, Wang introduced the PC 480-25C, a $8,595 machine based on Intel's 80486 chip and designed for server, UNIX multiuser and



workstation applications.

More recent evidence of Wang's commitment to standards came in April 1991, when it introduced several software products that allow users to control image processing on Wang VS midrange systems or PCs via IBM or IBM-compatible mainframe systems. The company also made it easier for users to integrate Wang imaging systems with Apple Computer Inc.'s Macintosh systems and with Microsoft Corp.'s Windows-based applications.

And any day now users should see UNIX systems from Wang based on reduced instruction set computing (RISC) technology supplied by Mips Computer Systems Inc. They'll be rolled out under Wang's Office 2000 banner, a high-profile marketing campaign aimed at persuading users that its new and future products hold the potential to raise white-collar productivity. "Whether it's too little, too late remains to be seen," says George Ellis, a securities analyst with Merrill Lynch & Co. Inc. in New York City.

"Wang realizes that's where it has to go," says Wang customer Donald Lucas of the supplier's move to standards—a direction in which his own company is also headed. The vice president of information systems at Otis Elevator, a Farmington, Conn.-based subsidiary of United Technologies Corp., also agrees with Miller's decision to focus Wang's efforts on systems for work group and departmental-computing users and not on full-bore enterprise solutions. "If you're resources are limited, you can't be everything to everybody," Lucas says. "Wang also realizes that it won't be a user's only computer supplier."—*Tim Mead*

AMDAHL CORP.

1250 EAST ARQUES AVENUE
SUNNYVALE, CA 94088
(408)-746-6000

RANK **14**
IS REVENUE **$2.16 B**

The period beginning in 1990 and stretching into 1991 may be remembered as the most challenging time in Amdahl Corp.'s history.

IBM introduced its first new mainframe architecture in many years and joined the ranks of price cutters. The worldwide economy was unsettling. And Amdahl decided to push into the world of UNIX and open systems.

Those challenges took their toll on the firm's 1990 financial results. Although Amdahl increased its customer base by 15% in 1990 to over 1,800 sites, its revenues remained essentially flat at $2.16 billion.

Reduced manufacturing and other expenses helped Amdahl increase earnings by 20.2% to $184 million. But compared with 1989, Amdahl's processor revenues for the year actually dropped, as the company was forced to discount its older 580 and 5890 mainframes by 40% and more to keep up with IBM price cuts. Amdahl president E. Joseph Zemke says he expects discount pressure to continue unabated through much of 1991.

Amdahl may not enjoy firmer prices until the end of this year, when the company finally begins to ship its newest mainframe generation, designed to compete with IBM's new generation of ES/9000 processors. Amdahl called the new 599 5 series of mainframes, which it announced in September, the most significant announcement in the company's history.

The family includes four models with 35 million instructions per second (MIPS), 7-nanosecond processors. The largest of that group, an eight-processor configuration, lists at $27 million and is rated at 328MIPS. That performance far exceeds the largest ES/9000 system. The problem for Amdahl is that it won't start shipping its largest machines, the M series, until sometime between the fourth quarter of this year and the second quarter of 1992. That will put the company significantly behind IBM.

Amdahl continued investing in open systems software, specifically UTS, its mainframe-based version of UNIX System V. In 1990, the company unveiled version 2.1 of UTS, the third major release of the operating system. The company also agreed to license from Sun Microsystems Inc. its Scalable Processor Architecture (SPARC) reduced instruction set computing (RISC) microprocessor architecture, opening the door for Amdahl to enter the market of UNIX- and standards-based servers. The company plans to move UTS to a new RISC platform.

Although Amdahl's push into UNIX has yet to win it big revenue increases, the company has picked up a few new hardware customers. One last year was Marshfield Clinic in Marshfield, Wis., which signed a $5 million contract to install an Amdahl mainframe running UTS to support over 1,000 commercial applications.

However, Amdahl's new UNIX business probably will not be enough to overcome the effects of ongoing economic uncertainty and a major mainframe product transition. In early 1991, Amdahl joined IBM in warning analysts of lower earnings. According to Zemke, much of Amdahl's weakness has been centered in the European market. He says Amdahl may see an improvement in its business in the second half of this year, but he's "not ready to call it a recovery yet."—*Jeff Moad*

TANDEM COMPUTERS INC.

19333 VALLCO PARKWAY
CUPERTINO, CA 95014
(408)-285-6000

RANK **15**
IS REVENUE **$1.87 B**

Tandem Computers Inc. is struggling with the effects of recession. The company's major customers—banks and other financial institutions that rely heavily on its various fault tolerant systems for their on-line networks—are putting a lid on capital spending. That has put pressure on Tandem's revenues, which grew by only 11.7% in 1990, down from 18% in 1989. U.S. sales growth was particularly low, dropping to 8% from 23%.

Net earnings suffered even more, falling 16.7% to $98.1 million. As the economy worsened during the year, Tandem's earnings suffered steadily, culminating in the last quarter's plummet to just over $7 million, compared with $30.7 million for the same quarter of the year before.

If there was some good financial news, it was the spectacular growth of Tandem's Japanese business. Annual revenues there have grown more than sixfold over the past five years, topping $140 million in 1990. Japan is now Tandem's single largest non-U.S. market, accounting for about 7% of total revenues. Tandem won some high-profile Japanese sales in 1990, including ones to Nippon Steel, Sumitomo Trust & Banking and Toyota Motor Corp. But Tandem also faces potentially serious competition in Japan from Fujitsu Ltd., which has begun marketing its own fault tolerant system, the Sure System 2000.

Despite the recession, Tandem is following through on strategies it has been developing for several years: diversifying into markets outside banking and finance, beefing up the performance of its hardware and converting its systems to reduced instruction set computing (RISC) hardware and an open systems environment based on the UNIX operating system.

Two actions in 1990 illustrate Tandem's approach to this economic downturn: the announcement of the Tandem Integrity S2, Tandem's first UNIX machine, and the purchase of Array Technology Corp., a small company specializing in storage technologies. Integrity was a milestone for Tandem, giving it a fault tolerant UNIX product. That may not win the company immediate orders in its traditional financial markets, but it should give the firm an entrée into telephone companies and government agencies.

The purchase of Array Technology will

help Tandem maintain a performance edge its hardware will need to remain competitive in the era of open systems. Through Ungermann-Bass Inc., which Tandem purchased in 1989, Tandem has already shored up its ability to provide standards-based connectivity solutions.

In January of this year, Tandem introduced its NonStop CLX 800 series, a midrange system offering a 55% performance kick over the older CLX 700. According to Gartner Group Inc., the Stamford, Conn.-based market research firm, Tandem is leaning on sales of the CLX to make up for slow sales of its high-end Cyclone line. But the CLX 800 may cut into low-end Cyclone sales, according to Gartner.

Robert T. Jolls, Tandem's vice president of product marketing, maintains that sales of Cyclone are strong and will do better as customers develop applications for the high end of the Cyclone line. According to Jolls, Tandem will introduce a RISC-based version of CLX this year. The firm will port its proprietary Guardian operating system to the new model, maintaining compatibility with applications written for pre-RISC CLX machines.—*Joe Kelly*

TRW Inc.

1900 Richmond Road
Cleveland, OH 44124
(216)-291-7000

RANK **16**
IS REVENUE **$1.85 B**

TRW Inc., an $8 billion conglomerate focused mainly on the defense and automotive industries, spent a good part of the 1980s building up its presence in software and systems. Much of this effort has come from within its huge Space & Defense group.

Last year, Space & Defense contract work accounted for the lion's share of TRW's $1.85 billion in IS revenue during calendar year 1990, up almost 13% from the year before. Despite a shrinking national defense budget, Space & Defense managed to land a number of important contracts, including one from the National Aeronautics and Space Administration (NASA) to develop a design for the Advanced Tracking and Data Relay System and a $139 million Federal Aviation Administration contract to modernize the U.S. air traffic control system.

Outside Space & Defense, TRW's IS business is focused within the Information Systems and Services (ISS) group. Consumers and companies outside TRW are most familiar with this group's extensive consumer credit and real estate database services. Credit-based revenue, which does not qualify for ranking purposes in the DATAMATION 100 survey, accounted for the majority of the group's $760 million in 1990 revenue. Slightly over half that amount was generated by what had been the Chilton Corp., a Dallas-based credit agency that TRW acquired in 1989. Last year, the company combined Chilton's database products with its existing customer credit capability and created a popular—and profitable—national credit file service.

Another side of ISS, TRW Financial Systems, is involved in systems integration. This group specializes in building imaging systems for large financial customers and works closely with a number of imaging hardware vendors, including Eastman Kodak Co. and IBM.

Since 1984, ISS has been growing at an annual compound growth rate of approximately 21%. Last year, however, ISS revenue slowed to about 8%, with operating profits falling to $49 million from $60 million in 1989. Management attributed the problem primarily to two troublesome divisions: the Customer Service Division (CSD), which provides third-party maintenance and repair of computer and electronic equipment, and the Information Networks Division (IND), which provides local area networks to government installations. Claiming CSD did not fit its long-term strategy, TRW sold the division early in 1991. It also reduced the size of IND and transferred its operation to Space & Defense.

More critical to ISS's long-term outlook is building up its systems integration business overseas. To that end, ISS signed its first European contract last year with BBS, a consortium of major Norwegian banks. The contract was for an image-processing system similar to those installed at ISS customers American Express Co., Citibank N.A. J.C. Penney Co. Inc. and New York Life Insurance Co.—*Paul Pinella*

Andersen Consulting

69 West Washington Street
Chicago, IL 60602
(312)-580-0069

RANK **17**
IS REVENUE **$1.75 B**

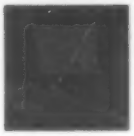
The decision by the partners of Big Six accounting firm Arthur Andersen & Co. SC to spin off its systems integration business in 1989 paid off handsomely in 1990. It was the first year Andersen Consulting stood apart from the tax and audit practice, now known simply as Arthur Andersen. Andersen Consulting's IS revenues of $1.75 billion were up an impressive 43% over last year's $1.22 billion figure. And while managing partner George T. Shaheen declined to discuss the company's 1990 earnings, he is confident that his team can grow these revenues 15 to 30% this year.

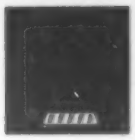
The source of most of Andersen Consulting's business—as well as all of number one competitor Electronic Data Systems Corp.'s $6 billion in sales and a growing chunk of IBM's $69 billion revenues—is systems integration. Shaheen defines an integrator as a prime contractor whose job is to bring together products from different hardware, software and networking suppliers to solve a problem or create an opportunity for the client company. To do this, Andersen is seeking to widen its alliances with other DATAMATION 100 suppliers and to sharpen its own software product offerings where its allies lack expertise.

Two allies out of Andersen Consulting's two dozen stand out in Shaheen's mind: Digital Equipment Corp. and Microsoft Corp. With Microsoft's Windows graphical user interface environment, LAN Manager network operating system and cadre of desktop software packages, Andersen Consulting aims to help big user organizations build client/server applications. With Digital, the firm intends to enhance the value of Digital's VAX systems in commercial environments, giving programmers software tools with which to work.

Those tools—among them are Method/1 and Plan/1—fall under a family of computer-aided software engineering products that Andersen Consulting calls FOUNDATION. The firm's other software products are applications: its MAC-PAC series is aimed at manufacturing needs, and DCS products are distribution applications. Shaheen points out that these products exist really to further the cause of Andersen Consulting's systems integration business. "We are not inventors of technology," he stresses. "We sell what others build. Time to market is the name of the game with us."

The firm's timing in 1990 worked well for Sun Refining and Marketing Co. The $8 billion Philadelphia-based subsidiary of Radnor, Pa.-based oil company Sun Co. Inc. found itself in an unusual position last year of having 40% unused mainframe capacity at its Dallas data center, the result of selling off an exploration group that had used the center's IBM machines for seismic number crunching. "We thought that if we could find someone financially strong that was in need of this asset, we could sell it and lease back services





from it," recalls Jack Donohue, director of information systems at the marketing subsidiary. After getting bids from three major systems integrators, he cut a deal with Andersen Consulting. Andersen got the data center, its 70 employees and a 10-year contract to supply Sun with its remaining processing needs.—*Tim Mead*

Automatic Data Processing Inc.

1 ADP Boulevard
Roseland, NJ 07068
(201)-994-5000

RANK 18
IS REVENUE $1.73 B

Computer services giant Automatic Data Processing Inc. last year executed a new strategic plan that called for providing a broad range of services in four business segments. Results were mixed.

ADP's total revenues inched up only 3% to $1.75 billion during the year, partly due to divestitures, as well as to slowdowns in some sectors. It was the second year in a row revenues fell below historic double-digit increases.

The strategy to provide a broader, and more integrated, set of services in the four business segments—Employer (payroll), Dealer, Automotive Claims and Brokerage services—began to be fleshed out last year, as ADP introduced new products and services in several areas. In Dealer Services, for example, ADP brought out a product in September called LaserStation. It uses Hewlett-Packard technology to supplement ADP's accounting, inventory and other service offerings by providing printed forms for auto dealers.

"I think we're on plan," says Arthur F. Weinbach, senior vice president of finance and administration. "As we go about identifying incremental services, we look at the transaction chain and try to take advantage of existing client relationships."

Financial performance in the four business segments ranged from good to disappointing. Automotive Claims Services racked up a 9% increase in revenue last year, a decline from the double-digit growth rates achieved previously.

Employer Services revenues grew about 15% overall, the same as last year. The National Accounts part of this business, which covers companies with 500 to over 50,000 employees, chalked up a 10% growth rate in 1990. One of the major wins for the company during the year was a 60,000-employee payroll contract, its largest to date, with Hyatt Hotels And Resorts. Growth in Employer Services, however, is being offset by recession-induced declines in both payroll size and frequency.

Dealer Services had high single-digit growth in revenues but, to the company's disappointment, did not increase the number of new sales compared with those made in the prior year. ADP did roll out new Motorola reduced instruction set computing (RISC)-based machines to replace the M4000 minicomputers it places at customer sites. ADP also signed an agreement with Chrysler Corp., under which ADP provides an exclusive nationwide parts locator service to about 5,000 Chrysler dealers.

Information services revenue from the top 100 North American companies grew 13.7% in 1990.

Brokerage Services revenues dropped about 7% between July and December last year due to the continued downturn on Wall Street. This compares with a 10% decline in all of 1989. This business, in which ADP has poured nearly $190 million in capital expenditures over the past three years, has not achieved the kind of return management had expected. "Brokerage is clearly not a growth business today," says ADP chairman Josh S. Weston.

"The ROI here is lower than we would like," adds Weinbach. "But we expect to see it out."

ADP continued pruning businesses that didn't fit the company's core business segments. The firm sold its Manufacturing Services business and 81% of its Brazilian data-processing business. As a result, overall head count dropped to 19,000 from 20,000.—*David R. Brousell*

Computer Sciences Corp.

2100 East Grand Avenue
El Segundo, CA 90245
(213)-615-0311

RANK 19
IS REVENUE $1.68 B

This power in federal systems integration had a good year overall in 1990. Both revenues and net earnings climbed 16% in 1990 over their 1989 levels. CSC's two major nonfederal operating units, the CSC Consulting Group and the Industry Services Group, scored 56% (20 to 25%, if acquisitions are not counted) and 34% revenue gains, respectively, in 1990, making major contributions to growth.

The Systems Group, CSC's federal business unit, chalked up only a 3% gain in revenue to $1.04 billion, but generated $1.2 billion in new contract orders, the revenue impact of which will be felt primarily in years to come. CSC says it won about 50% of the contract dollars it bid on in 1990, compared with only a 25% win rate in 1989.

In government business, major wins included a $94 million systems integration contract from the U.S. Treasury Department for cash flow and check-processing services; two contracts totaling $168 million from the General Services Administration for applications and services in the Pacific Rim; and a $347 million contract from the Environmental Protection Agency for a broad range of IT services.

Federal success is no real surprise for CSC. The real test of the game plan it formulated a couple of years ago is outside the federal arena, particularly in the commercial arena. In 1986, CSC's federal business accounted for 70% of revenues and 80% of earnings. But last year, CSC reached its goal of nonfederal revenues representing 40% of overall company revenues and 50% of earnings. Companies signing with CSC in 1990 included Bay State Health Care, for administrative systems; Boise Cascade Office Products Corp., for a distribution system; and Sterling Drug Inc., for reengineering its information systems.

Still, CSC is not yet perceived as a major player in the commercial arena. Says Andrew Brosseau, an analyst with Cowen & Co. in Boston: "CSC's federal business got better, but commercial hasn't gone as smoothly. The margins are bad. But it's a big opportunity if CSC can get it to go. They should adopt more of an industry focus than a functional focus."

William R. Hoover, CSC chairman and president, says he's quite satisfied with the company's efforts so far to develop vertical market expertise, particularly in the distribution, materials-handling and manufacturing sectors. He says, though, that CSC needs to build its capabilities in the retail and banking industries.

Another important part of the commercial thrust is to create synergy among CSC's business groups to satisfy requirements of commercial customers. CSC also wants to leverage the consulting expertise of such units as Cambridge, Mass.-based Index Group Inc.

CSC last year nailed three contracts that, it says, show the synergies are working. For example, CSC's Cleveland Consulting Associates Inc. and CSC Partners Inc. are teaming up to develop a distribution system for eyeglass retailer Pearle Inc., and specialty steel maker Weirton Steel Corp. hired Index Group to develop an integrated manufacturing information system.

"I'm not easily satisfied, but I'm pleased," says Hoover, of the company's efforts so far in the commercial market. "The amount of effort in the commercial market has really been quite strong."

—David R. Brousell

Prime Computer Inc.

Prime Park Way
Natick, MA 01760
(508)-655-8000

RANK 20
IS REVENUE $1.59 B

The world is already a tough place for companies that make proprietary midrange computers, but for Prime Computer Inc. the environment has been particularly unfriendly.

When 1990 started, Prime was still reeling from the hostile takeover bid by MAI Basic Four Inc. (now MAI Systems Corp.), a series of layoffs and a fast shuffle of top management that brought three successive presidents to the helm. The dust finally settled last year under the ownership of the New York City-based venture capital firm J.H. Whitney & Co., but the view that emerged wasn't pretty. Prime simply hadn't kept up with its competitors.

The rollout of new minicomputer models within the 50 series slowed to a trickle. With just three new systems introduced over two years, IS directors at last year's National Prime User Group (NPUG) annual meeting expressed anxiety about remaining overly reliant on Prime's flagship line.

Prime faces similar problems on the software side of the house. The company's acquisition of Computervision Corp. in 1988 made it the second largest computer-aided design/manufacturing (CAD/CAM) vendor in the world, behind IBM; according to the Framingham, Mass.-based research firm International Data Corp. After two years of diverting resources to other battles, Prime dropped to fifth position in the CAD/CAM market.

One explanation for the fall is simple. Parametrics design capability, a software feature that allows designers to track the relationship between various parts, became a prerequisite for success in the CAD/CAM market. And Prime didn't have it.

However, Prime isn't inclined to lie down and wait for the undertaker. The company was restructured last year into five independent business units. As separate profit-and-loss centers, the new units are designed to react more quickly to changes in the market.

At the NPUG meeting, a new 50-series system was unveiled, based on complementary metal oxide semiconductor (CMOS) technology. It was the first major change in the company's underlying technology since 1984, when Prime moved to emitter-coupled logic (ECL) circuits.

Parametrics technology is promised in the next Computervision release. And a Digital VAX version of Computervision's software is rumored as one of the first visible signs of influence by Prime's new president, John (Jack) J. Shields, the former Digital vice president.

In October, the company moved to shore up its weak position in the open systems market with the announcement of a partnership with Mips Computer Systems Inc. of Sunnyvale, Calif. The EXL 7000 series, a line of new UNIX machines based on reduced instruction set computing (RISC) technology, was the first offspring of that marriage.

Earlier in the year, Prime announced a UNIX version of its profitable Information database management software. About 40% of the installed base of 23,000 50-series computers run PICK-based Information software. With 20% of the total PICK market, Prime is the market leader and is well positioned to help customers integrate PICK and UNIX and make the transition toward open systems. With the introduction of a RISC line, Prime is hoping for new accounts, as well.

All in all, 1990 was a rebuilding year for Prime; 1991 should reveal whether the firm's struggle to catch up with a changing market can be successful.—*Chris Sivula*

Microsoft Corp.

1 Microsoft Way
Redmond, WA 98052
(206)-882-8080

RANK 21
IS REVENUE $1.48 B

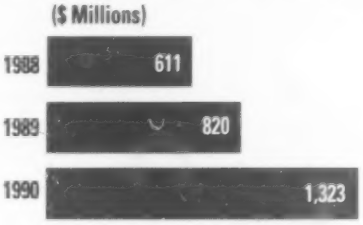
If Microsoft Corp. ever puts 1990 industry clippings into a time capsule, what future historians will read about most will be Windows, Windows, Windows.

Microsoft's Windows 3.0 graphical user interface became a phenomenal success after it began shipping on May 22, 1990. The software maker sold more than 2.5 million copies of Windows in the following six months. Analysts now expect the firm to sell 5 million copies this year and up to 8 million in 1992.

The fast-growing popularity of Microsoft's Mac-like interface among MS-DOS users is also driving sales of the company's slate of Windows 3.0-compatible software applications. Macintosh and Windows applications—principally Word For Windows and Excel For Windows—accounted for 48% of the company's revenue last year.

If new PC sales slip below the 10% growth rate that many analysts expect, Microsoft's strategy to sell Windows and Windows applications will likely succeed anyway. The reason: Windows runs under DOS, which has a base of more than 50 million DOS users worldwide, a good many of whom are likely to become Windows converts.

Microsoft's software revenue has grown 117% since 1988.

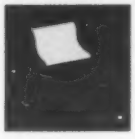


Chairman and chief executive officer William H. Gates is so confident of continued Windows success he's risked the wrath of corporate developers and fellow software manufacturers who bet the bank on Microsoft's and IBM's more advanced operating system, OS/2. He makes it clear that future versions of OS/2 from Microsoft—in particular, OS/2 3.0, a portable version specifically designed for reduced instruction set computing PCs—will support Windows and Windows applications. This contrasts markedly with OS/2 strategy statements made in the past by both IBM and Microsoft. Gates denies dumping OS/2 and defends his plans to enhance Windows.

"Corporations do have to adapt to the fact that Windows is doing a very high volume of sales, which OS/2 didn't. We're still very committed to OS/2. However, Windows is the mainstream product, and we are going to enhance the hell out of it," says Gates.

Besides its aggressive Windows drive, Gates & Co.'s major move into networking also stood out last year. Microsoft reportedly invested $40 million to $60 million last year to build a sales and marketing arm worthy of going head to head with networking heavyweight leader Novell Inc. The strategy revolves around Microsoft LAN Manager—Microsoft's answer to Novell's NetWare—and SQL Server, a server-based database management system.

The fate of the networking products is inseparable from OS/2: LAN Manager



requires OS/2. Yet whether Microsoft can make meaningful gains on Novell remains to be seen, especially after IBM and Novell signed an agreement early in 1991 for IBM to sell and support NetWare. Part of Gates's strategy is to build certain LAN Manager capabilities into future operating systems, rather than leave them in the networking software.

On the international front, Microsoft's international business—much of it from original equipment manufacturers—generated 55% of the company's total sales last year. That's a trend analysts expect will continue, with a smaller increase expected in 1991.

—John McMullen

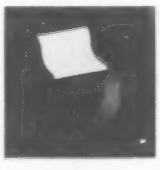
Conner Peripherals Inc.

3081 Zanker Road
San Jose, CA 95134
(408)-456-4500

RANK 22
1S REVENUE $1.34 B

Conner Peripherals Inc. won't soon forget 1990. The company shattered all calendar year revenue records, selling $1.34 billion worth of disk drives, up 90% over 1989. The company also more than tripled last year's earnings, finishing 1990 with $130 million. In October, it won approval from the New York Stock Exchange to have its stock listed on the Big Board. And, as if that weren't enough, last year's revenue figures made Conner—only five years old—one of the fastest growing manufacturing companies in American history.

Chairman and chief executive officer Finis F. Conner says the company's phenomenal growth is a direct result of its approach to the disk drive market. He says the company doesn't try to sell existing designs to original equipment manufacturers, but instead focuses on designing custom drives to meet specific OEMs' needs. The company's philosophy may be a carryover from its inception as a disk drive supplier to Compaq Computer Corp., which once made up more than 90% of Conner's sales. Although Conner has expanded its sales to many markets, Compaq still represents 21% of Conner's revenues and owns 29% of the company. That's down from the 29% of revenues and the 32% stake in Conner, Compaq owned last year.



In 1990, Conner added to its line of 2½ and 3½-inch hard disk drives with seven new drives for personal computers, laptops, file servers, fax machines and laser printers. Based on 16-, 32-bit and reduced instruction set computing designs, the drives are being purchased by an impressive list of OEMs, including Apple Computer Inc., Compaq, Data General Corp., Digital Equipment Corp., Sony Corp. and Toshiba Corp.

The company continued to push into the European and Asian markets in 1990; those areas made up more than 56% of its total sales. Although research and development takes place in San Jose, Conner manufactures drives in Malaysia, Scotland and Singapore.

New manufacturing plants, combined with new products, swelled Conner's ranks by more than 4,000 in 1990. The company finished the year with 9,300 employees worldwide.

Despite the computer slump in the United States, analysts say record revenue and growth should continue for Conner into 1991. The company's stock earned $2.51 per share in 1990, and Wall Street expects per share earnings in 1991 to top $3.50, due mainly to increased demand for 2½-inch laptop hard disks, one of Conner's best sellers.—*Mike Ricciuti*

Computer Associates International Inc.

711 Stewart Avenue
Garden City, NY 11530
(516)-227-3300

RANK 23
1S REVENUE $1.31 B

Computer Associates International Inc. continued to work hard to pull itself together last year into what is beginning to look more like a single company offering an integrated group of products. This may not seem like such a big deal, but considering the company's growth-by-acquisition policies of the past few years, it's not to be sneezed at.

Computer Associates's chairman and chief executive officer, Charles Wang, trumpets the achievement, in fact. "Given the complexities of the marketplace and the number and types of companies we've acquired, I'm proud of what we've done over the past year," he says.

The company reached several milestones that Wang had laid out over the past couple of years to make the acquisition strategy work. As the most important one, he cites the company's commitment to integrating all of its products under a single open architecture—the CA90s architecture announced on April 30, 1990.

"We announced the CA90s architecture, and it has been a tremendous success in the marketplace, an architecture that people can understand," Wang says. He contrasts the CA90s with IBM's Systems Application Architecture (SAA), pointing out that "SAA is now three or four years old, and IBM's customers are still looking for deliverables."

Software revenue from the top 100 North American companies grew almost 14% in 1990.

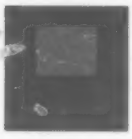
The CA90s architecture is aimed at bringing together Computer Associates's 300 or so disparate products so that they can work together on leading hardware and operating system platforms. CA is already enabling its IBM mainframe products to run under UNIX, for example, and has joined with Hewlett-Packard Co. to supply it with a complete package of systems management, database management and commercial software products over the next several months.

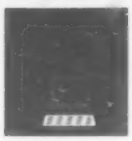
Computer Associates is already firmly ensconced in the IBM mainframe and PC world; last year CA also joined up with the Open Software Foundation and its rival UNIX International Inc., as proof of its commitment to open architectures.

Wang cites other achievements that he says show increasing responsiveness to CA customers' demands. "We are delivering what we promised last year," he says. "Our products are now in beta test for the VAX, we announced SQL capabilities for CA/IDMS and CA/DATACOM database management systems and, just as we said we would, we're shipping a PC LAN version of IDMS." All told, CA announced 70 new products, updates or enhancements last year. Only one of these—DBMS Inc.'s software management tool set—was acquired. The remainder were developed internally.

CA did take a few lumps when sales fell dramatically after the CA90s announcement. "The initial presentation of CA90s caused some confusion in the marketplace, but we're over that now," says Wang. Wang consistently has used the CA90s announcement to explain a sharp drop in sales by the company in the three-month period immediately following the announcement date.

Whether that explanation fits or not may be open to question, but last year's financial results do show strong improvement late in





the year. Overall, CA's revenue increased by a tiny 1.6% between 1989 and 1990. But in the final quarter of 1990, revenue shot up by close to 10% compared with the same period of 1989.—*J. William Semich*

DATA GENERAL CORP.

4400 COMPUTER DRIVE
WESTBOROUGH, MA 01580
(508)-366-8911

RANK 24
IS REVENUE $1.24 B

Once lauded in Tracy Kidder's *Soul of a New Machine*, Data General Corp.'s reverence for technology has hurt the company in recent years. As president and chief executive officer Ronald L. Skates admits, "It's not enough to be a technology company."

Last year might have been more humbly entitled *Sold Some New Machines*, as DG booked $100 million in sales for its AViiON computers. That wasn't enough to turn the red ink to black, as the firm continued to post declining sales and earnings. But, combined with cost cutting, it did give DG a profitable fourth quarter in calendar 1990, its first since 1986.

Chief among the cost-cutting measures was a reduction in work force. Once employing almost 17,000 people, DG cut its 1990 work force of 13,700 by 3,100, or 23%, through layoffs and attrition. Another 1,400 people were gone by March 1991, reducing total employees to 9,200. Skates expects to reach his goal of 9,000 people by September, through attrition.

In the last five years, Data General suffered from defections among its 35,000 ECLIPSE MV customers, many of whom lost faith that DG would continue to support this aging line of proprietary systems. Skates says the ECLIPSE bloodletting has "stabilized." In an attempt to combat the impression that DG's commitment to open systems means declining support for the proprietary ECLIPSE, the firm set up a separate ECLIPSE business unit. That group introduced four new mid-range and desktop computers in 1990.

But Skates refuses to predict whether 1991 would mark a return to the black for DG, citing worldwide economic uncertainty as a reason for caution.

He has other reasons for caution, too. The AViiON systems, based on the Motorola 88000 reduced instruction set computing (RISC) microprocessor, are themselves something of a risky proposition. Many of DG's RISC competitors are cashing in on the momentum associated with computers based on Sun's Scalable Processor Architecture chips or on microprocessors from Mips Computer Systems Inc.

DG's answer was, in part, a concerted 18-month effort to find software partners to support AViiON. More than 400 software vendors have ported close to 1,500 UNIX-based packages to AViiON. The number defuses, to some degree, objections that the Motorola engine is not standard enough.

In 1990, the company added to the low end of the AViiON line with machines that provide 17 million instructions per second of computing power for only $3,995. This March, the company pushed up the high end with the AV 7000 and 8000 systems, which deliver an attractive 117MIPS for $200,000. These systems are designed to lure customers who might move down to RISC-based servers from mainframes.

Organizationally, DG went through major changes last year. Most of the top 20 managers are new to the company. The restructuring also emphasized DG's entrepreneurial philosophy and deposited more accountability for profit and loss to the business units. And chairman of the board Edson D. de Castro, a DG founder and president until he handed over the reins to Skates in 1989, left the company on December 31.

Whether the Massachusetts company can buck the trend that has hit the state's ailing Route 128 technology zone remains to be seen. But improvements in product lines and cost control, coupled with new management, give Data General more hope than it's had in the last five years.—*Elaine L. Appleton*

NORTHERN TELECOM LTD.

3 ROBERT SPECK PARKWAY
MISSISSAUGA, ONTARIO, CANADA
L4Z 3C8
(416)-897-9000

RANK 25
IS REVENUE $1.22 B

The executives of Northern Telecom Ltd. want the company to become the world's leading supplier of telecommunications by the year 2000. In 1990, with total corporate revenue of $6.77 billion, analysts say, it was in sixth place. Its acquisition this year of Britain's telecommunications company STC PLC for $3 billion, will add nearly $2 billion to its annual revenue, lifting the company to third place. Northern Telecom says it now holds 6% of the world market for telecommunications equipment.

Although last year's revenues were up 11% from the $6.1 billion reported for 1989, they fell short of the 13% gain for the same period a year earlier, as both Canada and the United States were plagued by recession. Nevertheless, profits rose 22% to $460 million from $376 million in 1989. Northern Telecom's investment in research and development during the year dropped slightly as a percentage of revenues from 12% to 11.4% in 1989, but the dollar value rose by more than 6%, or $40 million; from $729.8 million in 1989 to $773.7 million in 1990.

During the year, Northern Telecom announced support of frame relay technology for its SuperNode central office switches. Frame relay has a key role in supporting bursty transmissions, such as LAN-to-LAN interconnection. Northern itself dropped out of the local area network business, terminating production of its Meridian LAN-Star line. The company only had 100 customers for the product.

The top 25 North American companies represent 81% of the total North American revenue.

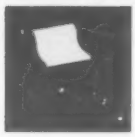
Analysts believe Northern dropped LANs to concentrate on its FiberWorld family of fiber-optic transmission and switching products for the central office market, Northern Telecom's major business. The company announced FiberWorld in 1989 as a Synchronous Optical Network (Sonet), making Sonet available through the telephone companies' networks, while temporarily maintaining the existing copper-based network.

Early this year, the company reorganized its top management and consolidated major product lines. Among other changes, it divided its world trade organization into two operating units, one based in London and the other in Tokyo. It set up three product groups: Public Networks, which includes switching, transmission and cable operations; Private Networks, which includes private branch exchanges, key systems, data packet networks, terminals and other products for business customers; and Wireless Systems, which includes cellular systems.

In the reorganization, Northern Telecom named Edward E. Lucente, former head of IBM's Asia/Pacific operations, as the company's senior vice president for marketing. Lucente will be part of a four-member executive office in McLean, Va., headed by Paul Stern, chairman and chief executive officer of Northern Telecom.—*Tom McCusker*

THE DATAMATION 100

PROFILES 26 - 50



TANDY CORP.

1800 ONE TANDY CENTER
FORTH WORTH, TX 76102
(817)-390-3700

RANK 26
IS REVENUE $1.21 B

For Tandy Corp., any year there's a recession can prove to be a difficult one. When consumers balk at spending money, Tandy's sales usually suffer, along with those of every other U.S. retailer.

Surprisingly, however, Tandy's overall revenues climbed 8% in 1990 to $4.65 billion. The portion of that revenue generated by information systems-related products amounted to $1.21 billion—almost a 24% jump from the $980 million in IS revenues garnered in 1989.

At the retail level, the company revamped the look of its Radio Shack stores and expanded its Name Brand Retail Group, which markets computers and other appliances under the name McDuff Electronics. Radio Shack shouldered much of the responsibility for meeting IBM's challenge in the home computer market—selling Tandy's 1000RL system against Big Blue's PS/1.

At the corporate level, Tandy's Grid Systems Corp. bore the weight of the company's efforts to sell systems to IS executives. In 1990, the Fremont, Calif.-based subsidiary faced challenges in defending its portable-computing turf against well-heeled competitors like Compaq Computer Corp. and Toshiba America Information Systems Inc.

Grid's weapons are formidable. The subsidiary last year introduced the 1450sx, a 7.9-pound, 80386SX-based laptop; the GRiD 1810, a notebook PC with a removable hard disk drive; and the GRiDCASE, a laptop with a built-in pointing device. It also maintained its lead in pen-based computing, a market expected by Dataquest Inc. to grow 10-fold between now and 1993, when unit shipments could approach 500,000 annually. The GRiDPad—a 4.5-pound keyboardless clipboard PC—practically owns the pen-based market, having caught on quickly with user organizations like utilities that have a large number of people working in the field. In January 1991, Grid also announced that it will support Go Corp.'s PenPoint, an operating system designed specifically for pen-based computing.

Grid has larger designs on the corporate IS market, as well. Last year, it introduced its first machine specifically aimed at the network server market—the Grid 486ei-25/SVR. And it's busy adding value-added resellers to complement its direct sales efforts.

—Bob Francis

STORAGE TECHNOLOGY CORP.

2270 SOUTH 88TH STREET
LOUISVILLE, CO 80028
(303)-673-5151

RANK 27
IS REVENUE $1.14 B

One of the clear beneficiaries of distributed computing and gutsy management is Storage Technology Corp. The huge number of personal computers, workstations and larger systems that were installed or networked in 1990 created gigabytes of information that many users chose to store centrally in tape cartridge libraries supplied by StorageTek. Demand for the company's 4400 Automated Cartridge System last year fueled revenues beyond $1 billion. And it funded much work on an important new storage product, code-named Iceberg.

The person who bet the Colorado ranch on the 4400 and Iceberg is chief executive officer Ryal R. Poppa. His conviction that greater storage requirements would be created by cheaper networked MIPS led the company in 1986 to focus on developing the library and to forego competition with IBM in another storage area, direct access storage devices (DASDs). The library can store data from as many as 14 different types of computer systems.

StorageTek's 1990 performance saved several of the chips Poppa had anteed up in

In 1990, 30 companies topped the $1 billion mark, compared with 25 in 1989.

his high-stakes storage game against IBM and Hitachi Data Systems Corp., the company's other big rival. StorageTek's revenue increased 16% from $983 million in 1989 to $1.14 billion in 1990 on the strength of the 4400 and related tape products, which together generated 71% of StorageTek's sales. The remainder came from two other product lines. Random access storage products, including two made by EMC Corp. that Storage Technology resells, made up 16% of revenue. Printers, a business now co-owned by Siemens-Nixdorf Informations-systeme AG, accounted for the remaining 11%.

Earnings grew an impressive 45% to $69.3 million, year to year. It's 1991 and beyond, however, that will prove whether Poppa's new product instincts were right. Winning the storage game won't be easy. IBM is expected to introduce a rival library product this year. And IBM and Hitachi will be aggressively marketing their 3390-class storage devices—the DASD generation of disk technology that StorageTek chose to skip.

Late in 1991, the world may see the tip of the Iceberg, StorageTek's next-generation storage device built around disk array technology. In 1992, users may be able to buy it in volume. And Poppa predicts that, in 1993, Iceberg sales will eclipse or at least match library revenues.—*Tim Mead.*

CONTROL DATA CORP.

8100 34TH AVENUE SOUTH
BLOOMINGTON, MN 55425
(612)-853-8100

RANK 28
IS REVENUE $1.12 B

If the sentiments of Bob Kirkman, a senior consultant at Combustion Engineering Nuclear Power in Windsor, Conn., are any indication, Control Data Corp. may have turned the corner in its long struggle to restore customer confidence.

In 1989, CDC posted a $680 million loss. But last year the company eked out a $2.7 million profit on revenues of $1.7 billion—despite a fourth-quarter loss of $23.8 million created by one-time contract cost overruns and losses on the sale of certain businesses.

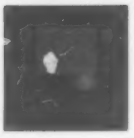
The ongoing turn around, says company management, has served to inspire new respect from users. Kirkman, the immediate past president of the CDC users group VIM, says, "It's been a tough haul, one requiring a very significant cultural change. But, personally, I think they have made the shift."

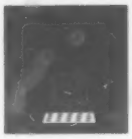
That shift has required a fundamental rethinking of the company's business and product line strategy.

In Computer Products, CDC's strategy is to shift away from being a mainframe company to a standards-based systems integrator for the government and discrete manufacturing markets. CDC hopes to shift its Cyber mainframe customer base, which numbers 1,700 units worldwide, over to the six-model CDC 4000 UNIX system introduced in January of last year.

So far, the Computer Products group's effort—backed by five consecutive quarters of operating profitability—is meeting goals, says Lawrence Perlman, who became chief executive in January. "The 4000 did a little bit better than we had planned," he says. "But 1991 is a challenge for us, obviously. We must sell a couple of hundred units in 1991."

The Cyber line got its newest family member, the 2000, last year. CDC shipped one





machine in 1990, to the University of Western Ontario. The Cyber side of the business also landed a major contract last year with the Army Corps of Engineers. Valued at $365 million over 11 years, the contract calls for Cyber 960 computers, networking and systems integration services.

These and other gains have buoyed the company's future outlook, which Perlman has quantified by targeting earnings and earnings per share growth at 10% per year. CDC won't make that target in 1991, but Perlman clearly wants substantial progress in that direction.

"A year ago, we had a customer base that was confused," he says. "The greatest achievement we've made in the computer business—apart from being profitable—is that we've identified a strategic path for customers."—*David R. Brousell*

ORACLE CORP.

500 ORACLE PARKWAY
REDWOOD SHORES, CA 94065
(415)-506-7000

RANK 29
IS REVENUE $1.06 B

Customers and investors alike were rudely shocked last year when they discovered that 13-year-old Oracle Corp. had grown up from the golden child of the software industry to become a fiscal juvenile delinquent.

Or so it seemed when, in the third quarter of 1990, the company disclosed a loss of $36 million on revenues of $204 million. The loss was apparently the result of some earlier creative accounting practices that booked some hopeful income as actual revenue—several large and never-paid-for orders. The company set about trying to mop things up by setting aside $42 million for unpaid customer bills, allocating $7 million against that quarter alone. Oracle's stock plummeted from a high of $26 to a low of $9 a share as a result. That added up to a paper loss of close to half a billion dollars for cofounder and chairman Lawrence Ellison, who owns about a quarter of the company's stock.

That kind of a loss can motivate a lot of change in a company, and Ellison responded quickly and aggressively. He laid off some 400 employees in a move to cut costs; knocked long-time chief financial officer Jeffrey Walker out of his job, putting him in a technical position; and bumped several top marketing managers into sales positions. Then he brought in Jeffrey Henly, a corporate finance pro, to be the new CFO. Henly set about trying to straighten out the books as quickly as possible with a team of outside auditors from Arthur Andersen & Co. SC, which was also charged with performing a management audit. As this story goes to press, in fact, word is that Oracle will be restating its 1990 and 1991 results once the audit is completed. As the restated numbers are not yet forthcoming, however, this year's DATAMATION 100 is using the original numbers.

And according to those numbers, at any rate, Ellison's action appears to be working; in the final quarter of last year, the company was able to turn that $36 million loss into a profit of $6.7 million. And, in this year's first quarter, the company reported a profit of $12.1 million. Still, Oracle is a long way from the kind of results it was showing just a year ago, when revenues increased by 95% and profits were running at close to $100 million.

Despite all the turmoil surrounding the company's financial status, Oracle is still moving ahead forcefully with a wide array of new and enhanced products. The company has announced a series of Windows and desktop-oriented products—including a HyperCard-like applications development platform, MS-DOS and OS/2 versions of Oracle Tools and an OSF/Motif version of the SQL*Forms and SQL*Menu report generators. The company has also started to ship its Oracle 6.2 relational database management system, which has parallel-processing capabilities, for VAX clusters.

—*J. William Semich*

INTERGRAPH CORP.

ROUTE 20
HUNTSVILLE, AL 35894
(205)-730-2000

RANK 30
IS REVENUE $1.04 B

Intergraph Corp. enjoys a rare competitive advantage—location. Distanced from the distractions of Silicon Valley or Route 128, where computer companies that make their own microprocessors are scorned and where market share is everything, Intergraph has transformed itself rapidly from just another workstation maker to a sharply focused supplier of workstation-based mapping, technical information and electronics design systems.

The focus on applications raised Intergraph's revenue's in 1990—as well as its expenses. Revenues expanded 21% to $1.04 billion, with fully 53% of sales and service dollars generated overseas. But earnings last year fell 21% to $62.6 billion. The biggest culprit in the expense category was the sales and marketing outlay, which jumped 33% to $209 million in 1990. Research and development investments, which grew 20% to $110 million during the year, also factored in Intergraph's higher cost structure.

Much of the R&D effort focused on Intergraph's 2000 line of low-end UNIX workstations and servers, which debuted in September. The 2000 products, starting at $15,900 for 12.5 million instructions per second of reduced instruction set computing (RISC) performance, complemented the 6000 line of midrange and high-end UNIX/RISC systems, which Intergraph had unveiled earlier in the year.

In the estimates of Dataquest Inc., Intergraph lost ground on the workstation battlefront in 1990. The San Jose-based market research firm figures that Intergraph's share of worldwide workstation sales slipped from 7% in 1989 to 6.8% in 1990. IBM, Silicon Graphics Computer Systems Inc. and Sun Microsystems Inc. meanwhile widened their turfs.

But, in the eyes of Intergraph president Eliott James, these figures are nearly meaningless. The 2000 and 6000 products, he believes, provide the company with a price/performance platform on which to build applications for its core markets—technical information management (which embraces computer-aided design systems), geographic mapping and electronics design. Major customer wins in these markets include the Union Pacific Railroad Co., which is digitizing and storing all of its information about routes and tracks onto Intergraph systems; and the American Information Technologies Corp., which is mapping information on 12 million customers onto Intergraph systems.

One engineering-intensive market where Intergraph's presence will be increasingly felt in 1991 is electronics. Earlier this year, the company purchased Daisy/Cadnetix Inc., the former Daisy Systems Corp. electronics design automation house, for $14 million and renamed it Dazix-Intergraph Inc.

With the Dazix acquisition, Intergraph also inherited another platform to support—Sun workstations, on which Dazix's software runs. But Intergraph's decision, subsequent to the Dazix acquisition, to buy $150 million worth of Sun equipment and resell it with Dazix software during the next three years doesn't bother securities analysts, who normally worry when a computer company tries to support multiple hardware architectures and operating systems. Analysts are encouraged by the rising importance of Intergraph's MicroStation software products, which run on Macintosh, MS-DOS and Sun platforms, as well as of the widening suite of electronics automation software that runs on Sun's systems.

Such moves shouldn't be interpreted as a sign that Intergraph is going to exit the hardware business, however. The alternative isn't appealing. "It's difficult to sustain a large software company," James says, observing that there are only four or five software companies that pull in more than $500 million in annual revenues.—*Tim Mead*

COMMODORE INTERNATIONAL LTD.

1200 WILSON DRIVE
WEST CHESTER, PA 19380
(215)-431-9100

RANK 31
IS REVENUE $995.7 M

Commodore International Ltd.'s five years of preaching the benefits of its Amiga line finally began to pay off last year. As the world tuned in to the futuristic multimedia messages of competitors Apple Computer Inc., IBM and Microsoft Corp., a shortage of affordable, easy-to-use products from those firms forced many multimedia enthusiasts to look elsewhere.

As a result, an increasing number of people bought Commodore's Amiga, a system even critics contend is well suited for graphics and sound processing, the basic ingredients for multimedia. Amiga sales exceeded 50% of corporate revenue for the first time in 1990, and Commodore finished the year with overall revenues up 15% from those of 1989.

Most of Commodore's success didn't become evident until the second half of the year. After stumbling through a number of management changes and disappointing sales of its MS-DOS based PCs, the company hit its stride. New Amiga systems at both the high and low ends of the family helped Commodore sell computers into a broader base of business, education and consumer markets. The company also reengineered its MS-DOS systems and introduced a more competitive family of PCs and laptops based on Intel 80386 and 80486 microprocessors.

The Amiga's strong multimedia reputation got a favorable boost early in the year from a small third-party equipment supplier. Newtek Inc. introduced an inexpensive expansion board and software that can turn the Amiga into a sophisticated post-production tool. The equipment can process video signals from a number of different sources, including television, videocassette recorders and video cameras, rivaling dedicated machines that sell for $50,000 and more.

Commodore sold more personal computers in Europe than any other company except IBM last year. But Commodore's traditional strength in Europe was offset by relatively weak sales in North American and Asian markets. Many analysts say that Commodore's biggest challenge this year will be to jump start its North American operation, which in 1990 brought in just 18% of companywide revenues. "The old news is that we haven't really succeeded in recovering in the U.S. to the extent we want," says Ron Alexander, Commodore's chief financial officer. "The good news is that we are a billion dollars in sales, and when the U.S. [market] does pick up, we should have real upside potential."

For 1991 and beyond, Commodore is counting on increased consumer interest to return it to the leadership position it enjoyed in the early 1980s. A new product introduced early this year called the CDTV Player may hold the most promise. Based on Amiga technology, the CDTV Player includes a compact disc player for both video and audio material and sells for under $1,000. Similar in concept to the still-unreleased CD-I systems from NV Philips GL and Sony Corp., Commodore's offering is available now and building up a software base. Says CFO Alexander: "I think we should be very well positioned for Christmas."—*Paul Pinella*

PC revenue from the top 100 North American companies grew more than 12% in 1990.

INTEL CORP.

3065 BOWERS AVENUE
SANTA CLARA, CA 95051
(408)-765-8080

RANK 32
IS REVENUE $980.0 M

Intel Corp.'s 80386 and 80486 flagship chips powered the company to a record year, despite competition from various high-powered reduced instruction set computing (RISC) chips. With sales booming, Intel pumped ever-increasing amounts of money into both research and development and new plant construction. R&D expenditures rose to $517 million in 1990, or 13.2% of revenue. Capital additions climbed 61% from $422 million in 1988 to $680 million in 1990 and are projected to exceed $800 million this year.

Last year, the company targeted the hot marketplace for portable computers as a key growth area. Intel introduced the 386 SL microprocessor and a companion input/output chip for use in laptop PCs. It also brought to market 1-megabyte and 4MB memory cards based on its nonvolatile flash memory technology.

At the other end of the computing spectrum, Intel's Supercomputer Systems Division has become a major player in the rarefied world of massively parallel supercomputers. Along with its commercial iPSC/860 machine, which can incorporate up to 128 of Intel's i860 RISC processors, Intel has been developing an advanced parallel machine as part of a project called Touchstone.

That project's goal, which should be attained late this year, is to demonstrate a prototype containing more than 2,000 processors and operating at more than 100 billion floating point operations per second (GFLOPS). Called the SIGMA, the prototype will make use of a successor chip to the i860, scheduled to be introduced sometime this month.

Happiness over record financial results at Intel in 1990 was tempered by the loss of cofounder and vice chairman Robert Noyce, who died on June 3, 1990. Noyce is credited as a coinventor of the integrated circuit. —*Dwight B. Davis*

MOTOROLA INC.

MOTOROLA CENTER
1303 EAST ALGONQUIN ROAD
SCHAUMBURG, IL 60196
(708)-397-5000

RANK 33
IS REVENUE $954.0 M

For years, computers were an unprofitable sideline for Motorola Inc., which enjoyed far more success making computer chips, cellular telephones and other communications products. However, over the past year, Motorola has energized its commitment to computers by unleashing a new workstation line and an enhanced version of its existing Delta midrange series.

The new Motorola systems, which use the new and much delayed Motorola 88000 reduced instruction set computing (RISC) microprocessor, have won high marks for their power and price/performance.

Unfortunately for Motorola, the firm's

overall computer sales are still short of expectations. According to Tom Beaver, general manager and vice president of the Motorola Computer Group, computer sales rose only 14.5% last year, primarily because of problems in Europe. According to Beaver, some poor pricing decisions and the lack of a multilanguage program for the firm's MultiPersonal computer stymied sales in Europe, which bring in more than a third of Motorola's revenues. DATAMATION estimates sales of the Motorola Computer Group at $355 million, including revenues from service and sales of single-board computers employing the virtual machine environment (VME) bus. Motorola is the leading supplier of VME boards, which represent about a third of the total Computer Group sales.

But 1990 did have its bright spots for the Computer Group. Motorola beat out Digital Equipment Corp. and IBM to be awarded a five-year $55 million dollar contract by the state of Tennessee for its Delta 3000 computers. And systems integrator General Automation Inc. agreed to buy more than $36 million of the Delta 3000- and 8000-series computers over the coming years.

Motorola's overall IS business, which consists of the Computer Group and the Codex Corp. and UDS/Motorola data communications subsidiaries, accounted for $954 million in sales in 1990, up 11% from 1989. Overall, sales rose 13% for Motorola, while net earnings were essentially flat at just under $500 million.

Codex has been struggling to make the transition from analog to digital technology and position itself as a supplier of networking systems. The subsidiary is plowing some $80 million a year into research and development, about 16% of its revenues, which is part of the reason it posted an operating loss of $1 million in 1990. Important new products introduced by Codex included release 3 of the Codex 9800 Series Network Management System. Sales and orders at UDS/Motorola rose primarily on the strength of the subsidiary's line of V.32 modems, which run at 9,600 bits per second.

Motorola also has decided to tackle the market for local area networks with a new type of wireless in-building network. The new Motorola network, which was announced in November, is said to be able to transmit at the full Ethernet rate of 10 megabits per second. Motorola says it is heavily committed to the wireless data communications market and intends to release a whole family of products over the coming decade.—*Joe Kelly*

Minnesota Mining and Manufacturing Co.

3M Center
St. Paul, MN 55144
(612)-733-1110

RANK 34
IS REVENUE $875.0 M

No one will ever call data backups exciting, but provide a way to make them easy, and the public will beat a path to your door.

That was the logic behind Minnesota Mining and Manufacturing Co.'s decision to pioneer the backup data cartridge, and it has no reason to be sorry.

Data cartridges helped fuel $800 million in sales of magnetic media products for 3M in 1990, according to the Santa Clara Consulting Group, which follows the magnetic media market.

In addition to data cartridges, 3M also markets data diskettes for PCs, ½-inch reel tape and 3480 cartridges. 3M's worldwide sales of media products grew nearly 20% over 1989, according to David Bunzel of the Santa Clara Group.

The demand for backup tape cartridges is expected to grow significantly in the 1990s, spurred by the growing popularity of server-based networks. The theory is that once data backup for PCs becomes the responsibility of someone other than the PC user—e.g., the network manager—interest in backup devices will soar.

Mainframe revenue from the top 100 North American companies dipped 10.1% in 1990.

At COMDEX Fall in Las Vegas last year, 3M was one of several vendors to demonstrate a 1.35-gigabyte data cartridge and drive system, the first in a series of gigabyte-class products and a substantial increase over the 525-megabyte models previously available. By introducing these gigabyte-class cartridges, 3M and the other vendors—which include Archive Corp., Sankyo Seiki America Inc. and Tandberg Data Inc.—hope to forestall market inroads from digital audio tape products.

3M reached into the 3480 backup market in a big way in 1989 when it bought IBM's Tucson, Ariz., plant for manufacturing data cartridges. 3M also competes successfully in the diskette market by emphasizing sales of its own 3M brand diskettes. In 1990, Bunzel says, 3M decreased its sales of unbranded diskettes.

In addition, 3M is involved in developing document-imaging systems, but that is still a fledgling venture. Beyond magnetic media, 3M's other major IS activity is providing information systems for the health care market through products such as Code 3, Health Evaluation and MedLab. DATAMATION estimates the health group's sales at about $75 million.—*Joe Kelly*

American Express Co.

American Express Tower
World Financial Center
New York, NY 10285
(212)-640-2000

RANK 35
IS REVENUE $827.0 M

In the 1980s, American Express Co. transformed itself from a travel services company into the prototype for today's financial services conglomerates. One by one it acquired brokerage houses, investment banks, international banks and insurance companies. Along the way, American Express also quietly bought up companies in the IS business.

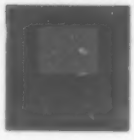
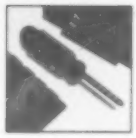
Today, IS is the bright spot on the company's otherwise checkered income statement. Earnings from the various operations that make up the American Express Information Services Corp. (ISC) were $10.5 million, accounting for more than half of American Express's total earnings of $181 million last year. Meanwhile, revenues from information services rose 25% to a healthy $827 million—but still just 3.4% of American Express's total revenues of $24.3 billion.

Overall, American Express had a tough year, as earnings fell way below the $1.1 billion level set in 1989. The big killer was American Express's Shearson Lehman Brothers brokerage and investment banking operations, which lost $956 million.

In January 1991, ISC took over the back-office processing operations of Shearson Lehman, establishing it as the Securities Information Group.

According to the ISC's newly appointed chief information officer, Richard F. Morrison, American Express is committed to leveraging its name in order to play a major role in outsourcing. Morrison says ISC is interested in pursuing outsourcing arrangements that go beyond banks and Wall Street.

American Express first got into IS in 1980, when it bought First Data Resources, the

world's largest processor of debit and credit card transactions. Over the years, it has acquired companies that provide processing services for a variety of industries, including health services and cable television. In addition, ISC has a proven track record in providing processing services to the financial community through its Shareholder Services Group.

In 1989, American Express grouped all of its IS businesses together into the higher profile ISC organization and made it one of the company's five operating-units. In 1990, American Express included a commitment to IS in its mission statement. Altogether, ISC employs more than 16,000 people.

Morrison says he expects the addition of the Shearson business to propel ISC beyond $1 billion in revenues this year. Also helping to fuel this growth will be ISC's acquisition of London-based Signet Ltd., the largest credit card processing operation in Europe.—*Joe Kelly*

CRAY RESEARCH INC.

655A LONE OAK DRIVE
EAGAN, MN 55121
(612)-683-7100

RANK 36
IS REVENUE $804.4 M

Cray supercomputers can model everything from global weather patterns to fighter jet aerodynamics, but the machines might short circuit if they were required to analyze the operations of their parent company.

Cray Research Inc.'s financial performance isn't the circuit breaker; it's the company's future product strategy that's challenging to analyze. Profits rose 27% to $113 million, despite the fact that revenue expanded only 2.5% to $804 million. What bears attention are two major shifts in the company's product strategy. For the first time, Cray began to address the less glamorous minisupercomputer market in the form of the Cray XMS line. And, for the future, the company announced its intention to build massively parallel systems.

The XMS superminis represent a reworking of technology developed by Supertek Computers Inc., which Cray Research acquired early in 1990. Starting at about $240,000, the XMS machines run UNICOS, Cray's flavor of the UNIX operating system. The machines also are compatible with Cray's installed base of X-MP supercomputers.

This year, Cray Research introduced the YMS line of minisupercomputers, priced from about $250,000 to $1 million and compatible with the 20 Y-MP models that make up the company's current suite of supercomputer offerings. Of its Y-MP models, six belong to the Y-MP2E class of entry level supercomputers, also introduced last year. Priced at $2.2 million and up, the Cray Y-MP2E machines are the first of Cray's supercomputers to use air, rather than liquid, cooling.

But if 1990 is remembered for anything at Cray, it will be as the year in which the company shifted from skeptic to convert on the subject of massively parallel processing (MPP). Last fall, Cray chairman John A. Rollwagen announced that the company would begin its own MPP project; a prototype machine is expected in 1992 or 1993.

Cray has by no means given up on its current architecture, which embodies at most a few powerful processors working in tandem. In its eyes, the Y-MP machines will not be superseded by future MPP supercomputers. "Massively parallel processing can, for some specialized applications, enhance general-purpose computing," Rollwagen says.

The MPP initiative and the expansion of Cray's products at the low end (minisupers) and high end (Y-MP/16) are part of an overall strategy aimed at expanding the company's revenues in the future. Other components of Cray's game plan include selling deeper into existing accounts, increasing customer satisfaction and widening the company's base of applications software. If Cray achieves its objective of 10% growth in sales in 1991, an analysis of the company will have to conclude that it's much more than a one-product-line company.—*Dwight Davis*

GENERAL ELECTRIC CO.

3135 EASTON TURNPIKE
FAIRFIELD, CT 06431
(203)-373-2211

RANK 37
IS REVENUE $800.0 M

General Electric Information Services (GEIS), the Rockville, Md., computer services arm of parent General Electric Co., operates an impressive worldwide teleprocessing network that handles some 400,000 user sessions each day and transmits some 300 million characters of data in and out of the system every hour.

As it did the year before, GEIS added 2,000 clients to its electronic data interchange business in 1990, for a total of 8,600 customers. The company also announced new services and applications based on EDI, which has become a foundation business for GEIS. One introduction was the EDI/EFT Translator software, which provides banks with reconciliation services for corporate clients. The company also brought out a new version of its EDI*PC software (version 7.0), which simulates a user's desktop through the use of icons, thus providing more efficient management of information flow.

Another product, called Customer Originated Electronic Payments (COEP), was added to the company's EDI services, permitting the electronic collection of receivables.

"We see major areas of our business where we're on the fourth or fifth document types in the trading community," says Paul Zoukis, GEIS's vice president of marketing.

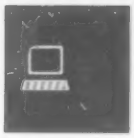
GEIS's major EDI customers are in the retail industry. Last year, GEIS launched a plan to help the Dallas-based retailer J.C. Penney Co. use its QUICK/Response Program to increase the number of suppliers linked to the J.C. Penney headquarters from 300 to 5,000.

The top 50 North American companies constitute almost 92% of the total North American revenue, the same as in 1989.

In answer to complaints that it had outgrown its ability to service customers, GEIS completed a streamlining of its EDI customer services operation last year. Reports of telephone calls unanswered for hours, and sometimes days, were curtailed by implementing stringent quality control measures and doubling the customer service staff to 50 people, says Robert A. Simmons, manager for EDI marketing. As part of the streamlining, GEIS opened its EDI customer service center in November.

In March, GEIS inaugurated CARGO*LINK, a network-based product for international trade and transportation. The service offers EDI for shipment data, database access for transportation business information, consignment tracking and electronic mail. Last year GEIS also introduced an international hotel reservation package called Manor, whose applications ultimately can be used in EDI networks.

The company began taking advantage of the political changes in Eastern Europe last year, first setting up a network node in what was East Berlin, then nodes in the former East German cities of Dresden, Chemnitz and



Leipzig. These activities soon wound down as GEIS clients' interests in reaching Eastern Europe waned in the face of political complexities. "We decided there's no quantum move we wanted to make until our clients are willing to extensively conduct their business in those areas," says Zoukis. —*Tom McCusker*

MAXTOR CORP.

211 RIVER OAKS PARKWAY
SAN JOSE, CA 95134
(408)-432-1700

RANK **38**
IS REVENUE **$789.4 M**

After more than eight years of solid earnings and steady management, Maxtor Corp. had some rough sledding last year. Despite raking in record revenues of $789.4 million in 1990, Maxtor had a $3.9 million loss in the last quarter of the year. President and chief information officer George M. Scalise, along with several high-level managers, departed shortly afterwards. James M. McCoy, a founder of Maxtor and board chairman since 1986, was named to replace Scalise as president and CEO. In May, Scalise was succeeded by Laurence R. Hootnick. And at the beginning of 1991 the company axed 140 workers.

Even though total corporate revenues grew almost 77% in 1990, net earnings tumbled 22% to $10.8 million. Most of that drop stemmed from the fourth-quarter loss, which Maxtor attributes to intense competition in the 3½ inch, 40-megabyte disk drive market and high costs associated with the acquisition of most of the assets of MiniScribe Corp., which was then operating under Chapter 11 bankruptcy protection.

Maxtor is a major player in the 5¼ inch drive market. In 1990, the company started shipping a gigabyte+ 5¼-inch drive. And Maxtor leads the market in sales of 5¼-inch 760MB and 380MB hard drives to original equipment manufacturers (OEMs), according to International Data Corp., the Framingham, Mass., research firm. But several big drive makers, including Micropolis Corp. and Seagate Technology are right behind it and closing fast.

Maxtor says the move to acquire MiniScribe is part of Maxtor's plan to augment its 5¼-inch technology with newer 3½-inch drives, in particular the 1-inch high, 3½-inch variety. With that in mind, the company recently turned to Japanese industrial giant Kubota Corp., its partner in an optical storage joint venture called Maxoptix, for fresh infusions of cash to help buoy the transition and to go after the growing optical storage market.

Maxtor continued to move its manufacturing operations overseas in 1990. The company's three divisions, which along with Maxoptix include Disk Drive Operations and Storage Dimensions Inc., manufacture hard drives and drive assemblies in several Pacific Rim countries, as well as in Brav, Ireland. The company says it will concentrate most of its manufacturing operations in Europe and Asia in the future, since it sells more than 40% of its products to OEMs there.—*Mike Ricciuti*

QUANTUM CORP.

1804 MCCARTHY BOULEVARD
MILPITAS, CA 95035
(408)-432-1100

RANK **39**
IS REVENUE **$716.3 M**

Quantum Corp. demonstrated its ability in 1990 as a surefooted player in a slippery market. When sales of 3½-inch hard drives slowed in the first quarter of 1990, it began making 2½-inch, 42- and 84-megabyte drives for laptop builders.

The result was a bonanza. Revenues reached $716.3 million, a whopping 82% gain over those of the previous year. Due mainly to the lowest operating costs in the disk drive industry, analysts say, total operating profit rose an impressive 65% to $93.7 million, and net earnings rose a correspondingly substantial 62% to $66.7 million.

The company introduced 10 new products in 1990, including additions to its ProDrive 3½-inch and GoDrive 2½-inch drive lines. Two new Hardcard drives were introduced by Quantum's Plus Development Corp. subsidiary. These drives install in expansion slots and offer 52MB and 105MB of storage to PC users.

One reason for the 11-year-old company's continued success lies in its growing customer list. In 1988, Quantum had four original equipment manufacturer customers, of which Apple Computer Inc. was, and still is, the largest. But the list has now swelled to 30, with the addition of AT&T, Hewlett-Packard Co., Intel Corp., NCR Corp., Next Inc., Sun Microsystems Inc., Unisys Corp. and Zenith Data Systems. The company also added European customers, including London-based Apricot Computers PLC; Brother International Europe Ltd., the European subsidiary of the Japanese firm; and the Swedish firm Victor. European sales make up 27% of Quantum's total revenues.

In October of 1990, Apple gave Quantum one of its biggest OEM contracts to date. The computer maker included Quantum's new 1-inch high, 3½-inch, Small Computer System Interface (SCSI) drives into new Macintosh models. The 40MB and 80MB drives are installed in Macintosh Classic, LC and IIsi models.

In 1991, Quantum will try to push even further into the laptop and notebook PC markets, according to chairman and chief executive officer Stephen M. Berkley. And analysts say that Quantum, with its low manufacturing costs and no debt to service, should fare well against competitors such as Conner Peripherals Inc. and Maxtor Corp.

—*Mike Ricciuti*

TEXAS INSTRUMENTS INC.

13500 NORTH CENTRAL EXPRESSWAY
DALLAS, TX 75243
(214)-995-2011

RANK **40**
IS REVENUE **$700.0 M**

On the surface, Texas Instruments Inc. defied corporate logic in 1990.

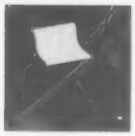
While most IS suppliers narrowed their product and services offerings during the year, TI continued to expand its focus on a variety of new systems and software. Notebook PCs, software engineering tools, printers, UNIX-based multiuser systems, industrial automation software and custom hardware manufacturing constituted the external products and services that TI tailored for information systems managers last year, ringing up IS revenues of $700 million, by DATAMATION's estimates.

Beneath it all lies a strategy built on TI's own vision of enterprise computing. As part of this strategy, the company's 9,000 external IS product and marketing workers are managed by the same man who commands the 1,000-person internal IS operation. John White, general manager of TI's Information Technology Group (ITG), runs his company's sprawling IS enterprise as well as overseeing TI's five IS product and service divisions.

White's dual command gives TI an advantage, although it didn't show up on the company's bottom line in 1990. White's group lost money last year, as did TI as a whole—a $39 million loss for the company in 1990 on flat revenues of $6.6 billion.

TI's edge, it seems, is its ability to spin off commercial products from the $300 million the company spends annually on its own IS operations. Software engineering is the most visible beneficiary. The company's Advanced Information Management Division, the smallest of ITG's five external businesses, markets a leading-edge computer-aided software engineering product known as the Information Engineering Facility.

TI also uses its extensive experience in



manufacturing operations to develop products for the Industrial Automation Division, known for its UNIX-based TIStar programmable controller systems and its VAX-based distributed control systems. The division generates about 20% of the IT group's revenues.

The biggest ITG member is the Peripherals Products Division, home of the company's successful MicroLaser line of desktop laser printers and Travelmate 2000/3000 line of portable computers. "We want to be a significant player in notebook technology," White states.

TI's Computer Systems Division specializes in making UNIX-based multiuser systems for users in the health-care, real estate, telecommunications and automotive industries. Like most systems companies with products designed around Motorola Inc.'s 68040 chip, TI's plans for using the 32-bit microprocessor were postponed because of delays at Motorola's end. Just the same, White claims TI expanded sales of its model 1500 UNIX multiuser systems (based on the 16-bit 68020 chip) by 70% in 1990. "And we're projecting significant growth in 1991—in part because we'll be delivering our first 68040 products," he says. More important, the ITG chief figures he can make money this year.—*Tim Mead*

The Black & Decker Corp.

701 East Joppa Road
Towson, MD 21204
(301)-583-3900

RANK 41
IS REVENUE $692.1 M

Last year, DATAMATION predicted it would be the first and final year Black & Decker Corp. would make the DATAMATION 100 list. The company was clearly interested in divesting the Information and Electronic Systems (IES) business it had acquired with the purchase of Emhart Corp. in 1989.

IES—composed of Advanced Technology Inc. and Planning Research Corp.—was on the block until April 1990. No one anteed up what Black & Decker was asking, so the firm decided to keep them.

"During the time Black & Decker was looking to sell its computer division, things were happening in the world that did not appear good for our computer business, which specializes in government contracts," a B&D spokesperson explains. "With the fall of the Berlin Wall and the changing political climate in Eastern Europe, the Department of Defense did not look appealing." But the Gulf War has changed that.

The latter half of 1990 was spent reorganizing and integrating the two companies into a new subsidiary, PRC Inc., which was formally established on January 1, 1991.

PRC's largest contract awards in 1990 were a $76 million contract for information resources management awarded by the General Services Administration's Office of Technical Assistance and a $65 million award from the U.S. Senate for systems integration of local and wide area telecommunications networks.

PRC also was busy providing systems and services to support the Gulf War. The company hopes to continue its presence in the Gulf, both supplying the military and participating in commercial opportunities that arise from rebuilding Kuwait. PRC has been recommended by Virginia's Department of Economic Development to help in the initial cleanup efforts.

Approximately 65% of PRC's total business is in the government sector (30% with DOD), but one of the major goals of the newly merged subsidiary is to increase its commercial business to reach a 50/50 balance with government.

Although it escaped sale in 1990, PRC's future with Black & Decker is not carved in stone. Black & Decker will own PRC "indefinitely," says the spokesperson, "but it will depend. It is doing well, and the potential to do better is so great."—*Sarah Lindsey*

Lotus Development Corp.

55 Cambridge Parkway
Cambridge, MA 02142
617-577-8500

RANK 42
IS REVENUE $684.5 M

"The Times, They Are A Changin'" might very well have been the theme song of Lotus Development Corp. in 1990.

Despite new threats from competitors and a slowness to embrace Windows, Lotus is still entrenched as the second largest microcomputer software supplier, behind Microsoft Corp. Lotus, which once seemed ready to bet the farm on OS/2, has done a complete about-face in the past 12 months. Plans for its OS/2 product have fallen by the wayside in the company's belated rush to catch up with Windows mania. Now in the works is 1-2-3/W, a Windows version of Lotus's long-lived 1-2-3 spreadsheet.

The software manufacturer is also at work on a Windows version of its Freelance Graphics presentation graphics program. And earlier this year, the company delivered a major upgrade to Lotus Notes, its Windows-based groupware application. Finally, last November's acquisition of Atlanta-based Samna Corp. has put Lotus in the Windows word-processing market with Samna's two established programs, Amí and Amí Professional.

"From our point of view, we made a substantial investment in OS/2," says Frank King, vice president of Lotus's software business group. "But I think it OS/2 will mean very little now. We will try to keep up with OS/2 in a modest way," says King, but he acknowledges that, for the moment, Windows has far outdistanced OS/2.

Lotus's fastest growing markets are outside the United States, a trend the firm is striving to change. On the product side, it hopes to boost domestic sales with 1-2-3/W and 1-2-3 For The Mac, which are both pegged for release this summer. In the last 18 months, the software maker has delivered versions of its spreadsheet on a plethora of hardware platforms, including mainframes, minis, workstations and PCs. Overall, Lotus saw revenue grow by 23% in 1990 to $684.5 billion and hopes to match that growth in 1991.

—*John McMullen*

NYNEX Corp.

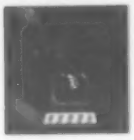
1113 Westchester Avenue
White Plains, NY 10604
(914)-644-6000

RANK 43
IS REVENUE $618.0 M

In 1990, NYNEX began reshaping its information services businesses by streamlining its organizational structure and focusing more on vertical markets. Over the summer, NYNEX disbanded its Complex Systems Integration Group, which had been used to bring together outside vendors and various NYNEX companies to handle large projects. The company now directs such projects individually—and, it says, more efficiently—from each of NYNEX's eight business units. Meanwhile, Telco Research Corp.—an integrated software and services group—was sold in November.

Three of NYNEX's business units are mainly providers of software, professional services and facilities management: AGS Computers Inc., The BIS Group Ltd. and NYNEX Computer Services. One is a national reseller—NYNEX Business Information Systems Co. The other four, such as New England Telephone, are primarily concerned with telephone service.

NYNEX's desire to focus on vertical markets is understandable, considering its success in the banking and financial industries. About 35% of the company's IS business is in those markets, says A. Theodore Engkvist,



currently president of AGS Computers. During 1990, Engkvist was president of NYNEX's Information Solutions Group, which this year was replaced by NYNEX Worldwide Services.

Strength in banking was a major factor in NYNEX's almost 25% growth of IS revenues last year. Other vertical industries doing well for the company are discrete manufacturing, communications, utilities and government. Engkvist says that NYNEX booked enough consulting and other services in 1990 to put the company among the top eight providers of such services.

Acquisitions also helped boost NYNEX's IS business last year. The company bought Stockholder Systems Inc. in September for $70 million.—*Mark Schlack*

SHL Systemhouse Inc.

Suite 501
50 O'Connor Street
Ottawa, Ontario, Canada K1P 6L2
(613)-236-1428

RANK 44
IS REVENUE $599.0 M

SHL Systemhouse Inc., Canada's leading systems integrator and computer services provider, has grown dramatically over the last two years through acquisitions. In 1990, however, the financial troubles of Systemhouse's parent company, Kinburn Technology Corp., put the company's future in jeopardy.

Kinburn, a management holding company, borrowed heavily in the 1980s to finance its various investments, which in addition to Systemhouse included Xios Systems Inc., an office automation company, and seven paper companies. But Xios couldn't compete with PC-based systems, and in 1990 the bottom fell out of the paper pulp industry, leaving Kinburn unable to meet its debt payments. After an unsuccessful effort to sell Systemhouse and raise cash, Kinburn's creditors stepped in and seized its assets. Systemhouse is now 56% owned by a group of Canadian banks and BCE Inc., with the rest in public shares.

The turmoil surrounding Systemhouse's owners scared customers away. New orders booked in one quarter last year fell as low as $4 million—down from a quarterly average of about $50 million. For the entire year, Systemhouse lost C$41.5 million ($35 million) on revenues of just under C$700 million ($599 million), including a C$35.6 million write-down during the year of goodwill and accounts owed by companies connected to Kinburn.

Systemhouse has been downsizing its unprofitable Washington, D.C., office, which accounts for about 15% of total revenues. But it was a big contract won in Washington that helped Systemhouse get back on track in a big way at the beginning of 1991. Systemhouse won an 11-year, $270 million contract to provide the U.S. Postal Service with the systems and services it needs to support its overnight express mail service. Systemhouse will provide the centralized database for the system out of its Houston data center, one of three that Systemhouse operates.

Systemhouse president Peter Sandiford points to the post office contract as an example of how Systemhouse is moving from being provider only of contract system development services to a more general purveyor of processing and management services. "We saw other people getting a lot of customer dollars after we put a strategic system in place," says Sandiford. "We are getting into outsourcing not from the point of view of being cost-cutting experts but from the point of view of providing a leading-edge service."—*Joe Kelly*

AST Research Inc.

16215 Alton Parkway
Irvine, CA 92713
(714)-727-4141

RANK 45
IS REVENUE $586.5 M

For AST Research, 1990 was the year to break through the $500 million revenue mark, throw off the clone image and take its place alongside other industry leaders. The firm defied critics who said this 10-year-old PC supplier would be squeezed from the high end by Compaq Computer Corp. and IBM and pressured by the low-cost bottom feeders who sell by mail.

AST proved them wrong by sticking to its two-tiered product strategy, laid down two years ago when it split its systems products into two families: the Premium and Bravo lines. The Premium family consists of high-end systems competitive with Compaq and IBM; the economically priced Bravo family competes against lower cost systems from the likes of Dell Computer Corp. and Northgate Computer Systems.

Both Premium and Bravo did well last year, with 386-based systems capturing $270 million in fiscal 1990 revenue alone. Last year, AST's 486 business accounted for 11% of overall sales. Sales of 80486-based systems are expected to increase at a faster pace this year, as customers of existing Premium systems take advantage of AST's Cupid-32 architecture and migrate to a 486 machine via a simple board swap.

AST also benefited from keeping manufacturing costs under control and delivering high-performance systems to its original equipment manufacturer (OEM) and value-added reseller (VAR) dealer channels faster than the competition. Over half of AST's 1990 revenues were linked either to VAR or OEM contracts with such companies as Tandem Computers Inc. and Texas Instruments Inc.

Despite spending only $18.4 million in research and development during fiscal 1990, which ended in June—an amount critics charge may not be enough in today's competitive market—AST introduced an impressive roster of new products last year. In October, the company began shipping its DualStation 386SX/16 to Japan and became the first U.S. manufacturer to offer a machine that meets both the MS-DOS and NEC 9001 computing standards. The Premium Exec family of notebook computers, manufactured in AST's Fountain Valley, Calif., plant, made its debut in November. The aggressively priced notebooks were hailed at COMDEX for their high performance and ability to upgrade the processor—an industry first.

Further proof of AST's rise to industry prominence is its international activity. Revenue from overseas sales accounted for 36% of the company's fiscal 1990 revenue, up from 29% in 1989.

As for 1991, AST will launch a new symmetric multiprocessor product line either late this year or early in 1992.—*Paul Pinella*

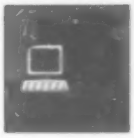
Science Applications International Corp.

10260 Campus Point Drive
San Diego, CA 92121
(619)-546-6000

RANK 46
IS REVENUE $569.0 M

Despite the recent success of high-tech weapons in the war with Iraq, the arms binge of the 1980s is over. That means tough times for weapons and aerospace manufacturers. But for companies like Science Applications International Corp., which provide the software, services and the expertise to keep the U.S. military machine running smoothly, things are different.

The 12,000-strong, employee-owned firm is a major player in the defense-oriented professional services market. SAIC raked in $1.16 billion in revenue in 1990, up 14% over the previous year. According to Jim Russell, senior vice president of corporate business development at SAIC's office in McLean, Va., nonweapons business that was primarily IS-oriented accounted for $569 million in 1990



revenue, an increase of nearly 19% over the previous year.

SAIC is in the midst of a $1 billion, eight-year contract to integrate information systems for the Pentagon's hospital network. Last year, SAIC won a $50 million contract to overhaul IS for the Department of Veterans Affairs's 170 hospitals and another $84 million contract to build a nationwide packet-switching network for the VA.

SAIC is honing its skills on nonmilitary federal government projects as part of a long-range plan to increase its role as a provider of system integration services to the private sector. According to Russell, SAIC wants to see commercial contracts account for 10 to 14% of its overall revenues by the mid-1990s.

SAIC is anxious to team up with computer and telecommunications companies for joint ventures in systems integration. Two areas in which SAIC wants to focus are document-imaging systems and geographical information systems. SAIC is also positioning itself to compete for facilities management contracts. It already has its first one: SAIC was chosen in 1990 by the Department of Energy to run its Albuquerque data center, a five-year, $32 million contract.—*Joe Kelly*

Martin Marietta Corp.

6801 Rockledge Drive
Bethesda, MD 20817
(301)-897-6000

RANK 47
IS REVENUE $549.4 M

In 1990, Martin Marietta Corp. rearranged the structure that generated $549.4 million in external IS sales in 1990—the Chantilly, Va.-based Information Systems Group (ISG)—in the name of cost cutting. Four hundred jobs were eliminated as a result.

The company folded together four ISG units—Civil Information Systems, Internal Information Systems, Postal Information Systems and Simulation Systems—dubbing them Martin Marietta Information Systems, and folding that into the Electronics Information and Missiles Group, based in Orlando, Fla.

Overall, 1990 turned out to be a good year for Martin Marietta. The company had seen defense dollars dry up in the past few years—leading it to eliminate 3,500 jobs corporatewide during the year. But Persian Gulf hostilities brought renewed vigor to the company's defense projects and new IS contracts. Corporate revenues grew $330 million to $6.13 billion during the year. Virtually all of this growth came from the company's IS businesses. Total IS revenues came to $820 million in 1990; however, one-third of that was generated from internal IS sales to other Martin Marietta divisions.

The company's Information Systems arm won a $70 million contract to modernize the Air Force Logistics Command's computerized equipment management system. The system tracks all Air Force equipment inventory, excluding weapons. The Simulation Systems division continued work on a multiyear contract to operate the Strategic Defense Initiative (SDI) Test Bed, a computer simulator for the Department of Defense. The work yields about $150 million in IS revenues annually for Martin Marietta.

New nondefense government business won in 1990 included a $526 million contract to consolidate the U.S. Department of Housing and Urban Development's separate data systems into a single network.—*Mike Ricciuti*

Dell Computer Corp.

9505 Arboretum Boulevard
Austin, TX 78759
(512)-338-4400

RANK 48
IS REVENUE $546.0 M

For 1990, Dell Computer Corp. seemed to show signs of maturity that many analysts felt had been lacking since Michael Dell began building computers in his college apartment in the early 1980s. The company's management remained stable for the first time in memory, well-timed products hit the market and some key relationships with distributors were established.

To top it all off, the company made a solid profit, particularly in the second half of the year, when recession jitters were hurting other computer companies. During the company's fiscal year, which ended February 2, 1991, it reported revenue of $546 million, up more than 40% from the previous year's $389 million. Net earnings hit a solid, and better than expected, $27.2 million.

According to Eric C. Zimits of the Dallas-based brokerage house Rauscher Pierce Refsnes Inc., Dell's distribution is shifting more toward value-added resellers (11%) and national accounts (41%), although direct telemarketing sales still account for about half of Dell's sales (48%).

That distribution shift may be even more apparent this year, as a deal with CompUSA Inc. (formerly Soft Warehouse Inc.) will send Dell computers through the retail channel for the first time. Meanwhile, Dell has begun to supply computers to large-scale systems integrators such as Andersen Consulting and Electronic Data Systems Corp.

Dell entered the UNIX market in 1990 with the introduction of the Dell Station PC, based on the company's 325E and 425E PCs. The Dell Station comes preconfigured with UNIX System V, office automation software from Uniplex and X.desktop, a desktop file manager. Dell also enhanced several of its bread-and-butter offerings last year, adding speed to its laptop 320LT and introducing some midsized desktop machines and two 6.4-pound notebook computers, the 212N and 320N. Many other notebook PC manufacturers are having trouble meeting demand for these systems due to a shortage of parts. Dell officials admit they may face the same problems in the future.

Overseas sales increased to 34% of the company's sales, up from 23% the previous year. To better service this business in Europe, Dell has announced that it is opening a manufacturing plant in Ireland, which should be in operation by early summer.

—*Bob Francis*

Dun & Bradstreet Corp.

299 Park Avenue
New York, NY 10171
(212)-593-6800

RANK 49
IS REVENUE $539.0 M

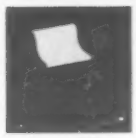
Dun & Bradstreet Corp. continues to try to prove to the world that bigger means better. Last year, the financial information and services giant pushed revenues up by $500 million, or nearly 12%, to approach $5 billion.

But while D&B's 1990 revenues jumped, operating costs increased even more, by $590 million. The result: net earnings dropped 13%, falling some $78 million to $508 million companywide last year.

The good news is that one major sector of D&B had a very strong year. The new Dun & Bradstreet Software Services Inc. had software revenue of $539 million in 1990. D&B Software was born in late 1989 from the marriage of software industry competitors Management Science America Inc. and McCormack & Dodge Corp.

D&B Software made the marriage work last year, bringing formerly competing staffs and products—and a combined 10,000 customers—into one family. Says D&B Software chairman John Imlay, "We knew the merger would give us a powerful market position... But it was a real challenge to bring together two formerly fierce competitors and mold them into one efficient unit."

D&B Software restructured and reduced duplicated staff, squeezing some 700 positions out of the new division's original total of 4,100.



Then the firm invested heavily in customer support services and systems, plunking down 25% of all research and development funds for support and announcing some 20 new products or product enhancements for existing customers. And finally, D&B Software set out a long-term technology strategy to bring together the two product lines under a future open-systems (read UNIX) architecture, which will include a strong dose of client/server-based distributed-computing capability.—*J. William Semich*

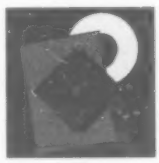
NOVELL INC.

122 EAST 1700 SOUTH
SOUTH PROVO, UT 84606
(800)-453-1267

RANK 50
IS REVENUE $497.5 M

Novell Inc. last year moved forcefully into the corporatewide computing arena, selling $90 million worth of NetWare 386. This network operating system, aimed squarely at larger, more sophisticated networks, amounted to 18% of the company's revenues. This year, with a little help from IBM, the product is expected to account for 35% of revenues, says James R. Tolonen, Novell's chief financial officer.

Revenues for all products hit $497.5 million, up almost 16% from $429.9 million in 1989. That was enough to give Novell a 57% share of the network OS market. Net earnings of $94.3 million was a sizable 79% increase over the $52.6 million of 1989.



Novell continued to generate new products in 1990. In May, 1990 it introduced the eighth generation of NetWare, its version 3.1 of NetWare 386, followed in early 1991 by version 3.11. These releases extend interoperability to non-DOS clients (Macintosh, UNIX, OS/2 machines) and provide a way to integrate third-party applications on the server.

In the spring, Hewlett-Packard Co. licensed the Portable NetWare networking software, which turns HP's model 9000 reduced instruction set computing (RISC) minicomputer into a file and print server for NetWare networks. HP is one of a dozen manufacturers that have signed licensing agreements for Portable NetWare.

In January of this year, Novell began shipping beta versions of its NetWare 3.1J software to Novell K.K., the company's Tokyo-based joint venture with Japanese software distributor Softbank Corp. At the end of 1990, the company brought in to the venture five additional Japanese computer heavyweights as investment partners: Canon Inc., Fujitsu Ltd., NEC Corp., Sony Corp. and Toshiba Corp., which had been technology partners only. Novell retains the majority interest.

The most intriguing development to watch for in 1991 is Novell's licensing, distribution and support agreement with IBM, under which Big Blue will market, service and support Novell's products, including NetWare 386. At minimum, the agreement will boost Novell's credibility and sales among corporate IS staffs who might otherwise lean toward LAN Manager or LAN Server.—*Tom McCusker*

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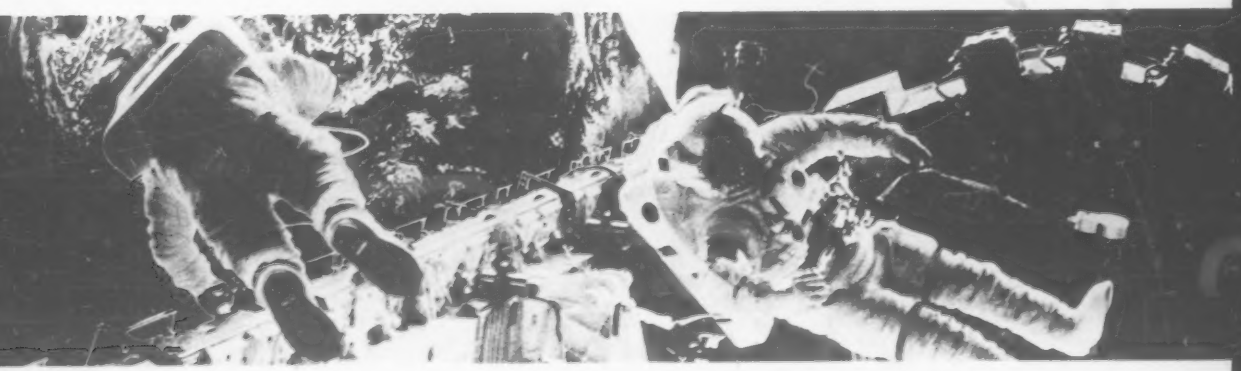

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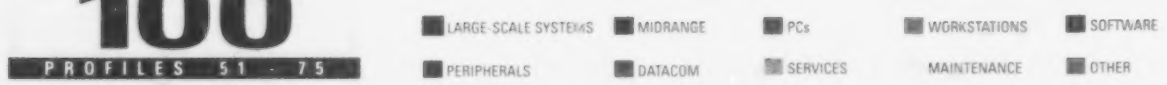
THE DATAMATION 100

PROFILES 51 - 75



51 **LOCKHEED** $494.0 M
433.0 61.0

52 **ERNST & YOUNG** $490.0 M
490.0

53 **SILICON GRAPHICS** $482.1 M
414.6 16.9 2.4 48.2

54 **WESTERN DIGITAL** $460.2 M
460.2

55 **WYSE** $460.0 M
175.0 230.0 55.0

56 **WORDPERFECT** $452.4 M
452.4

57 **3COM** $437.0 M
113.0 324.0

58 **MENTOR** $435.2 M
170.1 170.1 95.0

59 **EVEREX** $427.6 M
248.0 179.6

60 **TANDON** $421.8 M
418.5 3.3

61 **STRATUS** $403.9 M
403.9

62 **SHARED MEDICAL** $403.1 M
161.3 241.8

63 **McDONNELL DOUGLAS** $398.0 M
59.0 59.0 101.0 123.0 56.0

64 **MAI SYSTEMS** $389.5 M
116.8 58.5 77.9 140.3

65 **SOFTWARE AG** $389.0 M
175.0 81.7 85.6 46.7

66 **MICROPOLIS** $381.0 M
381.0

67 **PRICE WATERHOUSE** $370.0 M
370.0

68 **BELL ATLANTIC** $350.0 M
10.0 340.0

69 **DIEBOLD** $328.4 M
5.0 165.4 7.6 156.4

70 **ATARI** $325.7 M
325.7

71 **BOEING** $320.0 M
320.0

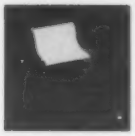
72 **KODAK** $320.0 M
50.0 145.0 125.0

73 **CONCURRENT** $296.0 M
198.3 97.7

74 **TEKTRONIX** $291.4 M
29.1 262.3

75 **GERBER SCIENTIFIC** $279.8 M
223.8 56.0

0 100 200 300 400 500
($ MILLIONS)



LOCKHEED CORP.

4500 PARK GRANADA BOULEVARD
CALABASAS, CA 91399
(818)-712-2000

RANK 51
IS REVENUE $494.0 M

In the early 1980s, flush with profits from its defense and aerospace business, Lockheed Corp. boldly marched into IS with a string of acquisitions in software, information services and graphics systems. Later in the decade, however, Lockheed realized it had strayed too far from its core markets, and it felt heat from corporate raider Harold C. Simmons, who launched an ambitious takeover attempt.

Over the last three years, Lockheed has been selling off IS subsidiaries as part of a corporate plan of restructuring and belt tightening. Dialog Information Services went to Knight-Ridder Inc.; CADAM Inc. to IBM; and, in March of 1990, Lockheed unloaded Metier Inc., a leading vendor of project management software, by selling it to Lucas Industries PLC of Birmingham, U.K.

All that's left of Lockheed's IS business are CalComp, a manufacturer of computer graphics peripherals, and Lockheed Information Management Systems Inc., formerly known as Datacom Systems Corp. Lockheed IMS sells systems for processing parking tickets and other fines to state and local governments around the country. Together, the two subsidiaries accounted for IS revenues of $494 million, just under 5% of Lockheed's total 1990 sales of $10 billion. For 1990, Lockheed's fortunes have soared like its F-117 Stealth fighter. It reported corporate earnings of $335 million, up from the $2 million reported in 1989. And in March of this year, Simmons dropped his takeover attempt.

CalComp, which makes plotters, digitizers and display products, is struggling with a major product transition and bruising competition from other graphics suppliers. It thrived in the past by selling its products to creators of computer-aided design (CAD) systems. But because the market for CAD systems has slowed, CalComp has been overhauling its entire product line. It now hopes to break into desktop-publishing and other more mainstream corporate markets. In September, CalComp dropped prices from 6 to 16% on its graphics tablets and plotters. It also reorganized its operations, decentralizing into five operating groups, cutting its 2,700 member staff by 5%.

According to William Conlin, CalComp's president, the reorganization will enable the subsidiary to better focus its sales force. "We needed to get more specialized on the sales side to deal with where the industry is going," Conlin says. The price cuts and reorganization are also aimed at strengthening CalComp sales efforts against one of its arch rivals, the much smaller Summagraphics Corp. In 1989, Summagraphics had offered to buy CalComp, which was then up for sale, but the talks did not pan out. Later, Lockheed took CalComp off the auction block.

Conlin said CalComp had a strong showing in Europe in 1990, which accounted for just under half of its sales. However, sales were essentially flat in its North American and Far Eastern markets.—*Joe Kelly*

ERNST & YOUNG

787 SEVENTH AVENUE
NEW YORK, NY 10019
(212)-830-6000

RANK 52
IS REVENUE $490.0 M

Ernst & Young is one of the largest professional services firms in the United States. Worldwide revenues from IS services totaled $490 million last year—not bad for a one-year-old company. Ernst & Young was born in 1989 from the merger of two accounting giants, Ernst & Whinney and Arthur Young & Co., and the firm says it has benefited from its new heft.

"The trend is toward big companies," says Alan Stanford, national director of information systems consulting at Ernst & Young. "It is now the 'Day Of The Large Firms,' with companies like EDS, Andersen Consulting and IBM. The market has made the statement that you've got to be big-scale. The age of the globally positioned service providers is clearly with us." The company has offices in over 100 cities worldwide and serves clients in numerous vertical markets, including manufacturing, energy, transportation, utilities, retail, finance, insurance and health care.

In June, Ernst & Young announced the Navigator System Series service, a comprehensive methodology for building information systems. The Navigator System comprises design, implementation and project management tools, documentation and consulting services for developing large-scale systems. Although not a computer-aided software engineering tool, Navigator works with CASE products, such as the Information Engineering Workbench set of tools from KnowledgeWare Inc., an Ernst & Young subsidiary. Navigator is also compliant with IBM's AD/Cycle CASE system.

"Navigator has gotten a very strong reception—it is in place in over 50 sites at *Fortune* 100 companies," says Stanford. Release 1.5, a maintenance version, is expected to be announced in June.

In November of last year, Ernst & Young opened the Center for Information Technology and Strategy in Boston. Designed as a think tank for creating strategies for information technology implementation, the center offers clients research and advisory services. As such, the center competes directly with the technology-planning functions of such market research firms as Arthur D. Little Inc., the Gartner Group Inc., and Index Technology Corp.

One of the major projects now under way at the center is the Integration Challenge, through which the center is working with about 20 *Fortune* 100 companies to determine how IT can be used to integrate a company's operations. The Boston center joins Ernst & Young's other research centers, the Advanced CASE Technology Center in Ann Arbor, Mich., and the just opened Advanced System Center in Las Colinas, Texas.

—*Sarah Lindsey*

SILICON GRAPHICS INC.

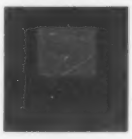
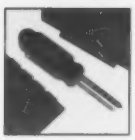
2011 NORTH SHORELINE BOULEVARD
MOUNTAIN VIEW, CA 94039
(415)-960-1980

RANK 53
IS REVENUE $482.1 M

Silicon Graphics Inc.'s focus on high-end graphics technology for the technical-computing market helped it boost sales almost 41% last year, rising to $482 million from 1989's $343 million.

SGI thinks this specialization in what it calls the visual-processing part of the graphics market will reap rewards in the future, too. "We think that the visual-processing market will grow from $1 billion today to a $5 billion to $6 billion market by 1995.While others move their products into the commercial market to replace PCs, we will focus strictly on the technical side," says executive vice president Mark Perry.

Dataquest Inc. ranks Silicon Graphics fifth in the $6 billion workstation market behind Sun Microsystems Inc., Hewlett-Packard Co., Digital Equipment Corp. and Intergraph Corp. The San Francisco-based investment banking firm, Montgomery Securities says that Silicon Graphics has a two-year lead in hardware, operating system software and application software relative to its competitors. By the end of 1990, there were 522 third-party vendors providing 1,025 three-dimensional graphics software applications for Silicon Graphics's machines.

Silicon Graphics's workstations and servers are built around reduced instruction set computing (RISC) microprocessors from Mips Computer Systems Inc. The line of binary-compatible machines ranges from $10,000 workstations to supercomputer-like models. Major 1990 product introductions included the announcement of a trio of workstations: the high-end 4D/200 POWER series, the 4D/300 series and the POWERVISION series. The company also released NetVisualizer, a visual network diagnostic tool, and the IRISVision 3D graphics board, which brings 3D graphics performance to 80386- and 80486-based PCs.

At the end of 1990, there was a small drop in U.S. business, largely due to a decline in sales to the Department of Defense and delays in the approval of the federal budget; 40% of Silicon Graphics's U.S. business comes from government contracts. The company expects the Gulf War to have a positive effect on future sales to the DOD. The 1991 federal budget also proposes 10% budget increases to both the Environmental Protection Agency and the National Aeronautics and Space Administration, two important government customers for the company.—*Sarah Lindsey*

Western Digital Corp.

8105 Irvine Center Drive
Irvine, CA 92718
(714)-932-5000

RANK 54
IS REVENUE $460.2 M

Storage and circuit manufacturer Western Digital Corp. became a billion-dollar baby in 1990 ($460 million of it generated by IS related business). But the company's once rosy profits plummeted like a lead weight by year's end. After chalking up net earnings of $31.9 million in 1989, the company reported a stinging $78.6 million loss in 1990. Precipitating the profit plunge was a one-time write-off of $66 million taken in December to cover restructuring costs.

Changing market conditions, resulting in a shift away from Western Digital's increasingly commodity-like printed circuit board business, took much of the blame. "Essentially, we deemphasized the board business," relates Robert Blair, Western Digital's vice president of investor relations. In its place, the company ramped up production of its successful integrated circuit technology, including the WD7600 chip set for laptop and desktop PCs and the WD90C20VGA video device.

Meanwhile, the company jettisoned its older line of low-end storage and video controller boards, opting to concentrate more on its intelligent 3½-inch disk drive business. Distribution strategies shifted more toward original equipment manufacturers (OEMs) and less toward resellers.

IBM's reentry into the laptop market, if successful, should help Western Digital's revenue in the second half of 1991. Western Digital says it has significant contracts to design and build the circuit boards for IBM's new seven-pound laptop, the PS/2 L 40SX. Also crucial to the company's immediate future will be its ability to deliver a new generation of 2½-inch disk drives for smaller notebook computers. As Blair puts it: "Our ability to get those to market and do it well will directly impact the company's bottom line performance in 1991."—*John McMullen*

Wyse Technology

3471 North First Street
San Jose, CA 95134
(408)-473-1200

RANK 55
IS REVENUE $460.0 M

Two years ago, many thought Wyse Technology would end up like many second-tier manufacturers of PC-compatibles—a once fast-rising star that burned out. The red ink was flowing copiously when a group of Taiwanese investors, called Channel International Corp., stepped in and purchased the company in January 1990. And, officials at the now privately owned company say Wyse has turned a profit for three consecutive quarters.

There's still much to be done, admits Daniel Wu, who has been president since the acquisition. "But we feel we have turned the corner," he says. That turnaround has come about primarily through Wyse's terminals business, which accounts for more than 50% of revenue and is growing at more than 15% annually. As a result, Wu plans to increase spending on research and development for terminals by 50% next year. But already the increased attention to terminals is paying off. In October, Wyse entered the emerging X terminal market and hired Arthur Lin[illegible] from Xerox Corp. as group general manag[illegible]

In previous years, Wyse missed out on opportunities in the PC-compatible market by not getting products to market faster. Last year, to rectify that situation, Wyse made its systems architecture easier to adapt to changing technologies. As a result, last September the company introduced several new products, including a high-end 80486 machine, a family of slim 80386SX PCs and a number of lower priced PCs. Then in March 1991, Wyse announced a 25-megahertz version of its 486 PC, along with a 20MHz version of its 386SX line. Although PC sales apparently are improving, Dataquest Inc. analyst Ronald Cooke doesn't believe the company's PC group is profitable yet.

Many analysts say Wyse's future lies in its family of UNIX-based high-end workstations and network servers, which were introduced in January 1990 and received favorable reviews. The series 9000i server is powered by eight 486 microprocessors, can handle 250 users and is priced at about $250,000. Last year, Wyse hired Richard Wesson to manage the Advanced Systems Group, which manufactures 9000i. Wesson previously was president and chief executive officer of Voysys Corp., a supplier of voice-processing systems.

Like many U.S. computer companies, Wyse's business is shifting overseas. In 1990, 40% of the company's revenue was generated outside the United States, up from 30% in 1989. That trend will likely continue, says Wu, particularly as Wyse's terminals business increases overseas. "Last year, we wanted to improve our cash flow position," says Wu. "We've done that. This year, our slogan is 'growth.'"—*Bob Francis*

WordPerfect Corp.

1555 North Technology Way
Orem, UT 84057
(801)-225-5000

RANK 56
IS REVENUE $452.4 M

Even though WordPerfect Corp. has yet to offer a Windows 3.0 version of its classic word-processing software, the company flourished in 1990 and is likely to do so again in 1991. Strong commitment from a long-established user base combined with a product that is available on virtually every type hardware platform have served the company well in the fast-changing word-processing market.

Boasting, by its own account, an overwhelming 65% share of the MS-DOS word-processing market, WordPerfect reached $452.4 million in revenues last year, a 61% increase over 1989's $281.4 million. The company expects revenue to top the $600 million mark in 1991, for an increase of almost 33%.

Alan Ashton, WordPerfect's president and founder, says such expectations are not unreasonable. He even labels the privately held company "recession-proof."

WordPerfect continues to follow a careful and deliberate approach to the Windows marketplace. After more than a year of development, WordPerfect 5.1 For Windows will be widely available this summer. As a

result, Ashton anticipates a big second half revenue boost. WordPerfect 5.1 For DOS and WordPerfect 5.1 For Windows are file compatible. The Windows version will require no conversion in the underlying file format, which is currently required to import word-processing files into Windows.

WordPerfect will not push the Windows release as the preferred version of the word-processing software, either. Says Ashton: "A lot of people are not aware of the additional hardware and memory required to run Microsoft Windows. For those not yet willing to upgrade the hardware, DOS may remain the preferred operating environment. For others, it may be Windows."

WordPerfect also hopes to ship Windows versions of two complementary products: the DrawPerfect graphics program and Office, which includes e-mail, calendar and scheduling software.

WordPerfect's word-processing products still dominate the company's sales, contributing 80% ($360 million) of the firm's 1990 revenue. DrawPerfect kicked in an additional $11 million in sales, which was a pleasant surprise, says Ashton. Office, available for the IBM PC and the Macintosh, as well as for UNIX workstations, generated $14 million. Ashton believes Office will blossom into a major contributor in another year or two.—*John McMullen*

3Com Corp.

5400 Bayfront Plaza
Santa Clara, CA 95052
(408)-764-5000

RANK 57
1S REVENUE $437.0 M

Modest gains in sales and lower earnings forced 3Com Corp. to reexamine both its identity and its strategy, leading to major shifts in both areas. In the first week of 1991, the company announced what had long been rumored: it would sell off its work-group-related businesses, including the LAN Manager operating system, and center its attention instead on network adapters and enterprise-networking systems such as bridges and routers. Putting it rather grandly, 3Com said it intended to focus on "global data networking."

Perhaps a first hint of its intention to bow to reality came in August when 3Com announced support for archrival Novell Inc.'s top-selling NetWare system software. But the big news occurred when 3Com handed off the rights for LAN Manager to Microsoft Corp., which had created the system with 3Com. The company also exited the network server, stations and Systems Network Architecture (SNA) work group connectivity markets. Implementing this new strategy cost 3Com a hefty one-time charge to net income of approximately $67 million in the quarter that ended February 28, 1991. The firm also reduced its work force by 150 people.

On the executive front, 3Com closed the books on some well-known names. Eric Benhamou, who came to 3Com when it merged with Bridge Communications Inc. in 1987, was named chief executive officer in August. He took over from Bill Krause, who held the job for nearly a decade and continues as chairman. Founder and director Robert Metcalfe retired in June at the ripe old age of 44.

The good news was that 32% of total sales in the quarter that ended in November 1990 were derived from new products such as 10BaseT adapters for unshielded twisted pair Ethernet networks. Some 12% of total sales went toward research and development expenses, a good bit more than the 9.3% spent in 1988. 3Com will maintain this rate of R&D spending, but hopes it can boost its position in the internetworking market by spreading those expenditures out over fewer products. International sales also increased steadily, amounting to 44% of total sales in the last quarter of 1990, up 11% from the comparable quarter in 1989.

"The company was really invested in too many things, and we needed to refocus for the 1990s," says Benhamou. "The big steps have all been taken and announced, and there are no surprises in the wings. We're perfectly positioned with the right amount of resources."—*Susan Kerr*

Mentor Graphics Corp.

8005 Southwest Boeckman Road
Wilsonville, OR 97070
(503)-685-7000

RANK 58
1S REVENUE $435.2 M

Newly located in Wilsonville, Ore., a pleasant, wooded community just outside Portland, Mentor Graphics Corp. reported a generally favorable year in terms of gross revenue. Nonetheless, reduced earnings growth kept this 10-year-old market leader in integrated circuit (IC) and electronic design automation (EDA) from having an entirely pleasant year.

Mentor entered 1990 with record sales growth, rising profits and a strong balance sheet. Early in the year, it announced the acquisition of Silicon Compiler Systems Corp., a San Jose-based supplier of IC design software for Sun workstations. This was followed by a $15 million order from Texas Instruments Inc. for IC design applications which, Mentor boasts, is the small EDA industry's largest ever contract.

Mentor also unveiled last year an aggressive shipping schedule for the latest generation, release 8.0., of its IDEA Series design automation software.

The Silicon Compiler acquisition gave Mentor a speedy route into the fast-growing Sun workstation software market; analysts had worried that Mentor's single-platform Apollo/HP-based product strategy would thwart the company's ability to expand into new markets. The move also added about 400 people to the company, bringing staff up to over 2,700.

Workstation revenue from the top 100 North American companies grew 34.7% in 1990.

But even in quiet little Wilsonville, world events can take their toll. Mentor's revenue fell as the recession intensified over the summer.

That doesn't explain why the company's much-ballyhood new release 8.0 fell so far behind schedule, however. Dates for both the HP/Apollo and Sun versions were pushed from late summer to the first quarter 1991 as the year wore on.

Thomas Bruggere, chairman and chief executive officer, admits that Mentor at first underestimated the size and scope of the release 8.0 development project. But now that the software has begun to be shipped, he predicts customers will be pleased with it. "It's the first true framework [type product] in the electronic design automation industry, and that's a big plus," he says, predicting that third-party software companies will support it with their own packages. By "framework," Bruggere means the product is modular and open to other EDA vendors' products.

The actual shipment of release 8.0 and associated Mentor applications on Sun and HP/Apollo platforms will dominate the news this year. And, while Bruggere won't say for sure, IBM's RS/6000 workstation remains a distinct possibility as Mentor's next big platform push.—*Paul Pinella*

THE DATAMATION 100

PROFILES 51 - 75

EVEREX SYSTEMS INC.

48431 MILMONT DRIVE
FREMONT, CA 94538
(415)-498-1111

RANK 59

1990 REVENUE $427.6 M

The deepening U.S. recession and a possible over reliance on domestic rather than international accounts put the brakes on fast-growing Everex Systems Inc. in 1990.

The PC and peripherals supplier learned that even the best laid plans can go awry. An aggressive telemarketer, Everex has used its sales staffs' extensive customer contacts to supply market intelligence to product engineers. That has made Everex responsive, but has deprived the company of a dealer pipeline to protect it from market fluctuations. Everex was already hurting from the slowdown in PC sales by the time its competitors first started feeling the pinch.

But the recession wasn't the only spoiler during the year. With only 10% of its revenues coming from overseas operations, Everex missed out on growing international markets and potential currency translation benefits.

"We also fell behind in product development—not in features and performance, but in the cost/production of our products," says Kimball Brown, director of investor relations at Everex. Brown says Everex continued using expensive discrete components while competitors embraced lower cost chip sets. "So our products got relatively more expensive than the competitors'," he explains. The situation culminated in February of 1991 with a 19% work force reduction cutting approximately 500 employees.

However, not all the 1990 news was negative. Following the summer announcement of its Tempo LX family of notebook PCs, Everex joined Compaq Computer Corp. as the only suppliers to actually ship notebook computers based on the 386SX microprocessor, although many others will follow this year. Meanwhile, the company's large investment in research and development paid off early in 1991 as more compact, reengineered desktop systems came on line with additional integrated components. "Those systems are now becoming a larger part of the revenue stream," says Brown.

Midrange revenue from the top 100 North American companies grew 12% in 1990.

While the Everex outlook for 1991 remains clouded by the economy, the company has taken steps to reform. In February, Everex named former Ingram Micro D executive Harold Clark as president and chief operating officer. Analysts say that frees former president and chief executive officer Steve L.W.

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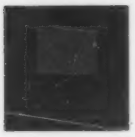


Hui to focus more on R&D in his new role as CEO and chairman. Meanwhile, Brown says that a new family of lighter weight notebook computers will be out by this summer, and that should be followed by an Intel-based multiprocessor system.—*Paul Pinella*

TANDON CORP.

301 SCIENCE DRIVE
MOORPARK, CA 93021
(805)-529-0340

RANK 60
IS REVENUE $421.8 M

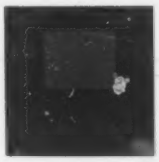
Back in the early 1980s when Tandon was best known as a disk drive manufacturer, it was also busy making PCs and supplying them to Tandem Corp., Tandy Corp.'s Radio Shack outlets and European computer companies.

So it was not a complete surprise when Tandon abandoned its troubled disk drive business in 1987 and started selling just PCs. What is a surprise is how successful Tandon has become competing against the likes of Compaq Computer Corp. and IBM.

In 1990, Tandon's revenue rose almost 12% to $421.8 million. And after years of running in the red, Tandon reported a net income of $25.6 million. The success in 1990 has prompted Sirjang Lal Tandon, who founded Tandon in 1976 and remains its chairman, president and chief executive officer, to launch a major assault on the U.S. market, where Tandon now has a negligible presence.

Tandon offers a broad line of PCs, from its notebook-sized Tandon NB/386 SX to the reduced instruction set computing (RISC) UNIX workstations it announced in March of this year. In 1990, more than half of Tandon's sales were of PCs based on the Intel 80386 and 80486 chips. Sales of these high-end personal computers produced an average profit margin of 30% for the year. Tandon's bottom line also benefited from the weakness of the U.S. dollar versus the West European currencies, where it derived 94% of its sales. Tandon maintains a network of more than 3,000 dealers throughout Europe.

To become a force in Canada and the United States, Tandon has recruited more than 250 dealers and value-added resellers, including marketing agreements with the Walden-software chain of 60 retail stores and also with INMAC Corp., the large direct response/catalogue marketer of computer products. Heading up Tandon's North American effort is computer industry veteran Graham C. Beachum Jr., who has previously been associated with a variety of PC manufacturers including Dell Computer Corp., IBM, Northgate Computer Systems and Tandy.



Tandon's family of RISC workstations will be based on the product line from Solbourne Computer Inc., the Longmont Colo.-based supplier of systems based on Sun Microsystems Inc.'s Scalable Processor Architecture (SPARC). Tandon will market the Solbourne line under its own name and also has manufacturing rights.—*Joe Kelly*

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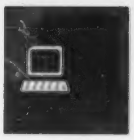


STRATUS COMPUTER INC.

55 FAIRBANKS BOULEVARD
MARLBOROUGH, MA 01752
(508)-460-2000

RANK 61
IS REVENUE $403.9 M

Stratus Computer Inc. fared well during last year's uncertain economic climate. This relatively small ($403.9 million) vendor of fault-tolerant computers has grown steadily over the last 10 years, primarily by selling its machines in traditional markets for on-line transaction processing—automatic teller networks, stock trading and credit card authorization firms. Last year, revenue growth of 18% and earnings growth of 4.5% came primarily from overseas expansion and sales to new markets such as telecommunications, retail and distribution.

Stratus has no choice but to garner new customers; original equipment manufacturer (OEM) IBM is selling fewer Stratus systems these days. Since 1985, IBM has resold Stratus systems under its own System/88 banner. Last year, IBM-derived revenue fell to 23% of Stratus revenues, down from 30% in 1989. Stratus officials say the relationship has matured, and IBM is not aggressively marketing the System/88. The company expects IBM-derived revenue to remain flat or even to drop further.

Rather than relying on existing OEMs IBM and Ing. C. Olivetti & Co. (which brought in 6% of the company's revenue last year), Stratus is appealing to new customers through a renewed emphasis on direct sales, particularly overseas. And it has built an armory of new products, both in its existing VOS line and its new UNIX-based systems.

Although the telecommunications market is a good one for makers of fault-tolerant systems, the UNIX systems Stratus announced early last year didn't perform as well as it had expected. This year, however, Stratus made headway by signing OEM contracts with LMEricsson Telephone Co. and NEC Corp., both of which sell to telecom companies. Those contracts are dependent on Stratus systems introduced in March 1991 that are based on the Intel i860 reduced instruction set computing (RISC) chip. Eventually, Stratus will build all of its systems on RISC engines.

A 30% gain nets Stratus No. 9 in North American midrange vendors.

International direct sales grew a healthy 48% last year. Almost half of Stratus's revenue comes from outside North America, and chief executive officer Bill Foster says Stratus has only "scratched the surface of Western Europe." Japanese customers, who tend to go outside Japan only for advanced technology, snapped up fault-tolerant systems from Stratus and competitor Tandem Computers Inc. last year, as the country's financial services industry continues to grow.—*Elaine L. Appleton*

SHARED MEDICAL SYSTEMS CORP.

51 VALLEY STREAM PARKWAY
MALVERN, PA 1935
(215)-296-6300

RANK 62
IS REVENUE $403.1 M

Shared Medical Systems Corp. had a healthy year in terms of revenue, breaking the $400 million barrier for the first time. That was only a 3.4% increase over 1989's revenue, but that's good in the hospital information system (HIS) field, which was essentially flat.

According to Jonathan Osgood, principal at the market research firm Alex. Brown & Sons Inc., 1990 "was a turnaround year for SMS. For four years, they've been scrambling to revamp their product line and make themselves more competitive. They changed a lot of the players, restructured the organization. That began to pay off in 1990, even though earnings didn't really show it." In fact, earnings actually dipped slightly from $23.1 million in 1989 to $22.7 million in 1990.

The major drivers for SMS in 1990 were the upgrade of its hospital information system for Digital Equipment Corp. machines and the first shipments of its IBM-based HIS.

Unity, introduced in March 1990, upgraded the Digital system, which is used by SMS's largest customer group. SMS added new applications and clinical management functions to this HIS, which replaces the older FMS Exact product. Unity makes greater use of distributed processing and local area networking. Half of SMS's Digital customers upgraded to Unity last year.

Perhaps more critical to SMS's future was the successful launch of Invision in the fall of 1989. The company began shipping this HIS for IBM machines in 1990, with good results. Ninety-seven clients, representing 127 hospitals, placed orders. Half were new clients, and half were upgrading from SMS's Independence line.

"For the first time in a while, Hospital Systems Division orders increased year over year," says Osgood. "Overseas business had a very good year and, for the first time, turned a slight profit."

Those kinds of results should help keep SMS at the top of the independent HIS provider list, as many other vendors struggle to stay in the black and grow in this highly competitive field.—*Mark Schlack*

MCDONNELL DOUGLAS CORP.

J.S. MCDONNELL BOULEVARD
AND AIRPORT ROAD
ST. LOUIS, MO 63166
(314)-232-0232

RANK 63
IS REVENUE $398.0 M

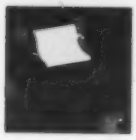
McDonnell Douglas Corp.'s IS subsidiary has been trying to be many things to many people. But two years ago, executives who ran the unprofitable subsidiary—then known as McDonnell Douglas Information Systems Co.—had sworn to a more narrow agenda for their slice of the aerospace maker's business.

They certainly kept their promise.

In July of 1989, the IS subsidiary was reorganized and rechristened the McDonnell Douglas Systems Integration Co. (MDSI). Its eight business units became three divisions. Previously acquired companies like United Computing and Microdata Corp. were consolidated or dismantled. And the company sold Tymnet, its networking services arm, to British Telecommunications PLC.

What's left is a much smaller IS business—and a much more focused one. Instead of a monolith with $1.3 billion in 1988 IS revenue, the company's revenue from systems and services now totals $398 million worldwide. However, the company is now making money in IS, earning $15 million in 1990.

The subsidiary is generating these profits through its ability to concentrate on selling a single function—systems integration services—to outside vendors. MDSI's three divisions supply products and services to commercial and government users. The Manufacturing & Engineering Division concentrates on computer-aided design, manufacturing and engineering. It features the Unigraphics 3-D CAD/CAM package and Infomanager, a data management integration package. The Infrastructure Solutions Division partners with government agencies, like the Massachusetts Water Resources Authority, and with architectural firms to implement McDonnell Douglas's Graphics



Design System database for site planning and structural analysis. The Industry Information Services Division offers services like outsourcing to users in such industries as insurance and telecommunications.

Almost a third of the company's IS revenue comes from outside the United States. Its international managers target users, like GM, that approach business globally. "Although you might have a problem in West Germany or Tokyo, we want to assure our customers that there's one person to call if you have to," says Mark Kuhlmann, newly appointed senior vice president/general counsel of McDonnell Douglas Corp. Earlier this year, the company hit a target of a different sort when Fujitsu Ltd. agreed to resell MDSI's Unigraphics software in Japan to run on Fujitsu's S-family of engineering workstations.

Twenty-five-year McDonnell Douglas veteran John Mazzola succeeded Kuhlmann as president of MDSI in April of 1991.

—Steve Paul

MAI Systems Corp.

14101 Myford Road
Tustin, CA 92680
(714)-731-5100

RANK 64
IS REVENUE $389.5 M

MAI Systems Corp. took on a new name and a new strategy in 1990, none of which seemed to help its balance sheet. Revenue remained virtually unchanged from last year, with losses nearly double those of 1989. The company's poor performance stems from the generally low demand for midrange computers, as well from MAI's failure to introduce new models within the past two years.

In fact, MAI got out of the business of making minicomputers last year, preferring the role of a value added reseller. Last November the company changed its name from MAI Basic Four Inc. to MAI Systems Corp. to reflect that transition. But most of its revenue (93%) still came from its own systems last year. It will take another two years before the company is able to generate a majority of its revenue from the VAR program, says Fred D. Anderson Jr., the company's president and chief operating officer.

Anderson expects VAR sales, primarily from Hewlett-Packard Co. systems, to account for 25 to 30% of revenue this year and 50% in 1992. In 1993, says Anderson, 80% of MAI's revenue will come from VAR sales.

As a VAR, MAI adds its applications software to computers made by Acer America Corp., Hewlett-Packard, IBM, NCR Corp. and Sequent Computer Systems Inc. This spring, the company added systems from Sun Microsystems Inc. MAI will target industries such as wholesale distribution, manufacturing, health care, hotels, transportation, retail, finance and construction. These are markets in which the company has been targeting its minicomputers for a half dozen years.

The software applications are written in Business BASIC. Last year, MAI introduced Open BASIC, an application environment that permits applications written in Business BASIC to run on other kinds of hardware. The firm's GPx product line, featuring the Dual Universe operating system, allows users to run applications written in either UNIX or Business BASIC concurrently.

As part of its transition to a VAR, MAI trimmed its staff by 400 and now has 3,500 employees worldwide. It also consolidated U.S. sales and service locations, taking a $59.7 million charge late in the summer.

In MAI's corporate offices, chief executive officer and chairman William Weksel resigned. He was replaced by Bennett S. LeBow, a director and chairman of the executive committee.—*Tom McCusker*

Software AG

11190 Sunrise Valley Drive
Reston, VA 22091
(703)-860-5050

RANK 65
IS REVENUE $389.0 M

For Software AG, 1990 was a year of streamlining, strengthening and stretching. Internally, the firm reorganized itself into a single worldwide company with management responsibilities split between Reston, Va., and Darmstadt, Germany. Externally, Software AG fortified its bonds with customers and struck a new partnership with Digital Equipment Corp. It also began flexing its technological and marketing muscle, shaped in the mainframe mold, into newer client/server configurations.

All that activity pumped up the company's revenue by a healthy 32% to $389 million. In the independent software industry, in which many fail and many others barely survive, Software AG not only has survived but thrived. Its success stems from Adabas, the robust database management system that started life as an IBM mainframe-based product. Recently, Adabas and its Natural language sidekick have begun migrating into more heterogeneous hardware realms.

In 1990, the firm made its biggest move into those areas when it unveiled its ambitious Entire family of client/server wares. The company's goal for Entire, says executive vice president Joe Agro, is "to provide an open architecture so our customers can do what they want with their hardware and still protect their investment while building the new systems they need." In fact, Entire's ability to cross multiple platforms independently and transparently is a basic foundation for Software AG's product development and enhancement strategy of the past several years and has provided the company with a strong base of loyal users. Longtime Adabas user Randy Ebeling, assistant data-processing director at the University of Texas at Austin, says, "that basic foundation has convinced us that they are able not only to map out a strategy but also to carry it out, as they're doing with Entire."

Last year, Software AG took steps to beef up customer satisfaction all around by quickly bringing to market several customer-requested add-ons and enhancements to the basic Adabas and Natural products. And the company expanded its professional services organization, which generates 15% of corporate revenue from customer services such as contract programming and turnkey installation of applications.—*Linda Runyan*

Micropolis Corp.

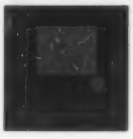
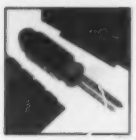
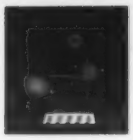
21211 Nordhoff Street
Chatsworth, CA 91311
(818)-709-3300

RANK 66
IS REVENUE $381.0 M

Following a difficult 1989, Micropolis Corp. spent the greater part of 1990 streamlining its manufacturing operations, rethinking distribution channels and going on a new-products binge. Afterwards, this large manufacturer of high-capacity 5¼-inch Winchester disk drives emerged with net earnings of $8 million and revenue of $381 million, a considerable improvement over a $50 million net loss from 1989.

Micropolis's poor 1989 financial performance certainly tested the confidence of its customers, which include original equipment manufacturers (OEMs) and computer systems resellers, admits Craig Ringuette, vice president of marketing. "There was a lot of concern among the industry watchers. At one point, the very survival of Micropolis was seen as very iffy. But we have had continual profitable [quarterly] performances since the second quarter of 1990."

Micropolis supplies disk drives to Digital Equipment Corp., Hewlett-Packard Co., Siemens-Nixdorf Informationssysteme AG

and Sun Microsystems Inc., among others.

The company was able to cut manufacturing costs by moving most of its manufacturing operations from the United States to the Far East, leaving its Chatsworth, Calif., headquarters as a flexible prototype design and development center.

Significant product introductions during 1990 included the fourth-quarter release of the 2-gigabyte model 1548 5¼-inch disk drive and the High Speed (HS) series Small Computer Systems Interface (SCSI) hard drives, which offer access times as low as 3.9 milliseconds.

To encourage increased growth in its distribution channel, Micropolis formed the Storage Systems Division at the very end of last year to provide products and direct support to its strategic resellers.

In the middle of 1989, development work on a high-performance 3½ disk drive was halted because, as the company's 1989 annual report states, "while [a high-performance 3½-inch disk drive] product appeared to be nicely aligned with market needs, the financial resources of the Company [are] inadequate to support additional investments in 1989." This month's pending announcement that Micropolis will offer a 3½-inch high-capacity gigabyte-plus drive may be an indication that the company has become more confident of its financial stability. —*Sarah Lindsey*

PRICE WATERHOUSE

1251 AVENUE OF THE AMERICAS
NEW YORK, NY 10020
(212)-819-5000

RANK **67**
IS REVENUE **$370.0 M**

The button-down image that Price Waterhouse's tax and audit partners have cultivated for years belies the roll-up-your-sleeves attitude that the firm's information services consultants bring to their practice. Their willingness to take on tough IS assignments, such as the massive programming effort involved in overhauling a government agency's human resources system, is winning respect and customers.

The firm's IS revenue has nearly tripled in the past three years, reaching $370 million in 1990. About 80% of its business lies with providing systems integration services to commercial customers; the rest is government work.

Although Price Waterhouse doesn't dismiss competition from other Big Six accounting firms or the service arms of major systems suppliers, the firm sees users themselves as its biggest rivals. "Their own shops are the biggest integrators," says Robert Cawly, managing partner of Price Waterhouse's Applied Technology Center in Tampa, Fla. The firm's challenge, he explains, is to become the so-called enterprise integrator for user organizations—a role that requires Price Waterhouse to show customers cost-effective ways to manage their entire information systems, not just parts of it.

Accordingly, there are four parts to Price Waterhouse's enterprise IS strategy. The firm aims to:

- Use knowledge-based tools to reduce the cost of implementing new applications for users;
- Provide systems reengineering, which means making the most of a user organization's existing code and systems architecture;
- Create industry-specific software for markets in which the firm specializes—notably banking and finance, oil and gas, public utilities, retailing and insurance;
- Introduce change management to organizations, orienting them to structural and strategic changes enabled by developments in technology.

Price Waterhouse distinguishes itself from others as much by what it doesn't do as by what it does. It doesn't provide facilities management (outsourcing) services. Unlike other Big Six firms, it doesn't resell hardware and software, although it does have numerous alliances with major suppliers whose products Price Waterhouse helps its customers install and use. Allies include the Dun & Bradstreet Corp. and Tesseract Corp. in the software realm and Digital Equipment Corp. and IBM on the hardware side.—*Steve Paul*

BELL ATLANTIC CORP.

1600 MARKET STREET
PHILADELPHIA, PA 19103
(215)-963-6000

RANK **68**
IS REVENUE **$350.0 M**

Bell Atlantic Corp. had a respectable 1990, with companywide revenue up 7.4% to $12.3 billion and earnings up 22.1% to $1.3 billion. Bell's information services businesses, consisting largely of maintenance services, contributed $350 million in revenues to the overall revenue figure, 9% more than in 1989.

"Bell Atlantic had a good year," reports Richard C. Munn, president of the market research firm Ledgeway/Dataquest. "They're clearly the largest player in the independent services business."

Bell Atlantic's Business Systems Services division, which offers hardware and software maintenance, has seen its biggest growth in large accounts containing mainframes and complex data networks, says Janet Wallace, division vice president of marketing. The focus on mainframes is something of a departure for the division, which used to focus predominantly on mini and standalone micro business.

This shift in focus was possible in part because Bell Atlantic invested in added IS expertise, which allowed the company to launch the XTRA maintenance program for DEC VAX computers and for IBM mainframes and the AS/400 mini. The new service addresses problems caused by hardware, software and networks.

Although Bell Atlantic grew 9% in 1990, it dropped one spot in the 1990 North American ranking.

In 1990, Bell Atlantic formed a partnership with CGI Consulting Inc. to service local area networks. In the beginning, that partnership will target Novell NetWare sites with a service called LANplus. Bell Atlantic also cashed in on the boom in workstations through an agreement with Sun Microsystems Inc. Bell Atlantic people will now serve as Sun field service engineers in the eastern United States. Wallace says both LANplus and the Sun business will be major focuses for Bell Atlantic in 1991.

The company also made some inroads in software last year. In July, Bell Atlantic Software Systems released an enhanced version of its LASER expert systems development environment. And in December 1990, the division announced that it will integrate LASER into IBM's AD/Cycle applications development framework.

Bell Atlantic acquired the Simborg Systems Corp. software company in June 1990. Renamed Bell Atlantic Healthcare Systems, the division markets hospital information systems. In December, this group inked contracts for its StatLAN system with five U.S. hospitals.—*Mark Schlack*

DIEBOLD INC.

818 MULBERRY ROAD
CANTON, OH 44707
(216)-489-4000

RANK 69
IS REVENUE $328.4 M

Counting on Diebold Inc. has become a way of business for many banks that have plugged in the company's automated teller machines (ATMs). Diebold's arsenal of ATMs grew even bigger last year when it teamed up with IBM in a joint venture euphonically dubbed InterBold. InterBold plans to offer self-service banking products ranging from simple cash-dispensing equipment to full-function ATMs that pack the power of 386 engines and can be linked to Token Ring networks.

In the United States, Diebold's main rival is NCR Corp., which matches it for orders every year and has an installed base of roughly 30,000 units. Nevertheless, the InterBold combo, with IBM's installed base, now accounts for 65% of the U.S. ATM market.

Furthermore, the alliance with IBM provides global advantages for Diebold, an attractive situation in view of the uncertainties in the U.S. banking industry.

"The IBM joint venture gives us a huge base of operation outside the U.S.," says Diebold president and chief operating officer Bob Barone. Diebold's numbers reflected its strength overseas last year: IS revenue rose a robust 34.7% in 1990 to $328.4 million.

Barone, who is also CEO of InterBold, expects the U.S. banking business to pick up by the end of this year. He also predicts that InterBold's ATMs will be roaming further afield, moving into more workplaces, fast-food restaurants, resort hotels and casinos. These off-premises machines, he notes, will dispense not only money, but coupons and tickets for transportation and sporting events, as well. On-site ATM action in the near future will take place in bank lobbies, according to Barone, who explains that InterBold is working on a system that will use imaging technology to automate the teller-intensive check-cashing process.

—Linda Runyan

The top 75 North American companies account for 97% of the total North American revenue, the same as in 1989.

ATARI CORP.

1196 BORREGAS AVENUE
SUNNYVALE, CA 94089
(408)-745-2000

RANK 70
IS REVENUE $325.7 M

Atari Corp. has come a long way since its early days of selling Pong video games. Still, several owners and more than 10 years later, the company is struggling to reach the end of a rocky financial road and become a force in the personal computer business. Like many PC makers, it ran into some rough sledding in 1990.

The company's total corporate revenue was down 3% from that of 1989, to $411.5 million. Revenue from personal computer sales dropped 13% to $326 million. Fortunately, the sale of the Federated Group of electronics stores, purchased in 1989, helped offset a $25 million operating loss, resulting in an almost $15 million net earnings gain for the year.

While admitting that 1990's sales and profits were disappointing, chief executive officer Sam Tramiel says the company is looking to new products released in 1990 for a sales boost this year. These include the TT030, a PC based on a 32-megahertz, 32-bit Motorola 68030 microprocessor, and the MEGA STE PC based on the 68000 chip.

Atari is also looking to portable PCs for increased sales. One new product released in 1990 is the Portfolio, a 1-pound, palmtop PC that ships with a Lotus 1-2-3 spreadsheet clone and a word processor for less that $300. It was followed early this year by the Atari STylus, a pen-based system with optical character recognition, and by the more conventional Atari ST, an IBM-compatible notebook PC.

Tramiel cited a shortage of 80386 microprocessors as a reason for the slowdown in sales of the company's Intel-based PCs in 1990. Nevertheless, Atari plans to introduce a new Intel-based line later this year to round out its IBM-compatible offerings.

The company's European sales, which account for a critical 83% of total revenue, continued to soften in 1990. Atari blamed the sluggish sales picture on increasing competition from European computer makers and the general economic slowdown.

—Mike Ricciuti

BOEING COMPUTER SERVICES

2810 160TH AVENUE, S.E.
BELLEVUE, WA 98008
(206)-655-1131

RANK 71
IS REVENUE $320.0 M

The 1990 economic recession that plagued much of the nation bypassed the Pacific Northwest, largely because of The Boeing Co.'s continued strong performance. The showing of its IS subsidiary, Boeing Computer Services, reflected that trend. Overall, the division showed a modest gain, up 11% from $1.5 billion in revenue in 1989 to $1.66 billion last year.

Virtually all of the gain came from the company's main line of business: providing computer and telecommunications services to its parent corporation's healthy defense, space and commercial airline divisions. External sales of Boeing Computer Services's integration services were disappointing. After posting a 31% increase in 1989, the company's outside business declined by about 11% in 1990 to $320 million.

Contracts with the federal government make up the lion's share of the division's external computer business, and that segment accounted for all of last year's drop in business. Boeing Computer Services's government business dropped 16% while outside commercial business rose more than 19%.

Much of the growth in commercial business came when the giant marine transportation company, Nippon Yusen Kaisha, decided to base its computer operations in Seattle and have Boeing Computer Services plan, install and test its new facility.

The Boeing subsidiary has made some efforts to rebound from last year's drop in government business. The company was selected to provide the Naval Weapons Center in China Lake, Calif., with information services under a five-year, $105 million contract. And the U.S. Army Reserve recently chose the firm to compete against Computer Sciences Corp. in a one-year demonstration project for the Reserve Component Automation System. The winner receives a 12-year contract to improve the readiness and mobilization capabilities of the National Guard and Army Reserve.—*Chris Sivula*

EASTMAN KODAK CO.

343 STATE STREET
ROCHESTER, NY 14650
(716)-724-4000

RANK 72

IS REVENUE $320.0 M

Eastman Kodak Co. has seen the promised land of electronic imaging and wants to get there in a hurry. During the past year, Kodak unveiled an awesome array of new products, including scanners, printers, workstations, software, digital copiers and the pioneering Photo CD, a compact disc for storing and displaying photographs on televisions and computer displays.

"We are committed to being the best in imaging, period," says David Giddings, Kodak's vice president and general manager of worldwide imaging information systems marketing.

Kodak has been playing on the periphery of the IS business for years, largely through its computer output microfilm systems, which allow computer data to be printed directly onto microfilm. In the late 1980s, the company introduced the Kodak Information Management System (KIMS), a turnkey system for image management based on Digital Equipment Corp.'s VAX systems. And suddenly Kodak found itself competing head-on with the likes of IBM. "Most companies with an information systems backbone in place didn't want to replace it with a whole new system," explains Giddings. In January of this year, Digital took over the marketing of the KIMS 5000 system, with Kodak supplying the software and peripherals. Kodak still offers the KIMS 4000, which is based on the OS/2 operating system.

It will be years before the Photo CD and other electronic-imaging products begin to make a serious impact on Kodak's bottom line. In 1990, the company's overall revenue inched up just 3% to $18.9 billion. Earnings, at $703 million in 1990, were cut dramatically by the $873.2 million Kodak had to pay Polaroid Corp. in the patent dispute over instant photography. DATAMATION estimates that Kodak's sales of IS products took in about $320 million last year. This figure includes sales from Atex Publishing Systems, the once pioneering, but now moribund, editing and publishing system that Kodak bought in 1981. The figure also includes revenue from Interactive Systems Corp., one of the leading UNIX software houses, and revenue from the sale of printers, which range from the high-speed 1392 laser printer (which Kodak markets through IBM), to desktop ink jet and laser machin. —*Joe Kelly*

CONCURRENT COMPUTER CORP.

106 APPLE STREET
TINTON FALLS, NJ 07724
(201)-758-7000

RANK 73

IS REVENUE $296.0 M

Concurrent Computer Corp. barely stayed afloat last year. The highly leveraged company missed several months' worth of loan payments when the failing Bank of New England shut off the company's access to a $15 million revolving credit line in December. That action, plus the demands of some bond holders, sparked Concurrent's anxious scramble to avoid Chapter 11.

This March, the firm announced a restructuring plan that gave 70% of the company to bond holders but saves the company $55 million in cash over the next two years, says president and chief executive officer Denis R. Brown. That maneuver saved the company from bankruptcy. The debt restructuring plus the September appointment of Brown to the posts of CEO, president and vice chairman calmed anxious users of Concurrent's real-time systems.

"With the new CEO coming in and the debt restructuring, I feel confident that they're making some real improvements in the structure of the company," says John Barris, president of the Concurrent user group Interchange Inc. "I'm feeling a lot better about them surviving through this year and beyond," adds Barris, who is also director of computer systems at Yale University's Wright Nuclear Structure Laboratory.

New CEO Brown, a turnaround specialist, succeeded James K. Sims, who resigned when the company announced losses of $38 million in the second quarter of 1990. Brown blames the financial problems on an overly optimistic growth forecast and a bloated cost structure. When revenue didn't meet projections, he says, the optimistic forecast and the heavy debt load "collided in midair."

The most pressing duties faced by Brown after taking on his new positions in September were to restructure the debt load and reduce costs. He shrunk costs by closing a manufacturing plant in Cork, Ireland; by reducing the work force by about one third (or 900 people); and by consolidating sales and service offices. By now, costs should be diminished by about $70 million, Brown says.

Plans are also in place to sell physical assets, including the corporate headquarters facility (which the company intends to lease back), to help pay off the debt. That debt includes a note for $43 million, due over the next three years, and another $10 million revolving line of credit.

Once again afloat, the firm can turn its attention to product development, such as investigating how best to bring more UNIX-based real-time products to market.

—*Elaine L. Appleton*

TEKTRONIX INC.

PO BOX 500
14150 SOUTHWEST KARL BRAUN DRIVE
BEAVERTON, OR 97077
(503)-627-7111

RANK 74

IS REVENUE $291.4 M

It was a rough year by any measure for Tektronix Inc., the venerable maker of test and measurement equipment that in happier times has also shown strength in computer peripherals and graphics workstations. With sales slipping, board member Robert Lundeen was appointed in April as the company's acting president and chief operating officer.

Lundeen took swift action to turn the company around. By the end of the year, some 1,500 positions were eliminated, manufacturing plants were closed in Hoddesdon, England; the Isle of Guernsey; and Vancouver, Wash., and a number of unprofitable peripherals businesses were sold or shut down—including the company's money-losing workstation and semiconductor test systems businesses. Even so, Tektronix remains a force in graphics terminals, printers and plotters.

Analysts generally hailed Tektronix's efforts to restructure its business units. At the same time, most cautioned that getting expenses in line was just half the battle and that the development of new revenue streams was paramount. Returning the company to profitability is now largely up to Jerome J. Meyer, a former vice president of Honeywell, who was appointed president and chief executive officer in November.

There were some revenue gainers in 1990, including high-end digital oscilloscopes and the acquisition of Colorado Data Systems Inc., an Englewood, Colo., maker of test equipment add-in boards for computers. The company also reported increased sales in its color printer unit, a positive response to several new products from its television division and success with its new X terminal family.

New product introductions clearly hold the key to the company's future. A new generation of color printers, due in this summer, should help boost earnings in the near term. For 1991 and beyond, Tektronix's work in flat panel displays looks particularly promising. Tom Long, vice president of technology predicts that most manufacturing challenges

for the flat panel displays will be met within 18 months and that large volume production will begin shortly thereafter. Longer term, he expects other new product breakthroughs based on the company's ongoing superconductor research.—*Paul Pinella*

GERBER SCENTIFIC INC.

83 GERBER ROAD WEST
SOUTH WINDSOR, CT 06074
(203)-644-1551

RANK 75
IS REVENUE $279.8 M

H. Joseph Gerber started Gerber Scientific Inc. in 1945 when he built a graphical numerical computer called the Gerber variable scale. Today Gerber heads what has grown to be a $300 million organization. The company's 2,400 employees design, make, sell and service Gerber's own line of computer-aided design and computer-aided manufacturing systems used to automate the design and production processes in a dozen industries.

Gerber's five main subsidiaries reflect the variety of businesses it serves. They include Gerber Garment Technology Inc., Gerber Optical Inc., The Gerber Scientific Instrument Co., Gerber Scientific Products Inc. and Gerber Systems Technology Inc. The company also operates subsidiaries in six European countries, as well as in Canada, Mexico and the Far East. Non-U.S. sales accounted for 50% of Gerber's 1990 revenue.

Nearly half of Gerber's sales are from cutting, nesting and material handling systems for the apparel, aerospace, automotive and furniture industries. A second major source of revenue is the firm's microprocessor-controlled production systems for the sign-making and graphic arts industries. Gerber also designs and sells interactive production, drafting and photo-plotting systems, which accounted for 15% of 1990 revenue. Interactive mechanical design, manufacturing and data management systems represented 4% of revenue.

Recessionary pressures in capital equipment spending late last year pushed sales down slightly at Gerber. In the first nine months of the company's fiscal year, which ended April 30, 1991, revenue dropped by 12%, and net earnings plunged 72%. However, unphased by what they describe as a temporary downturn, company planners upped spending on research and development by 2%.

Fifty-nine of the North American companies report IS revenues as 100% of their business.

In 1990, David J. Logan, president of Gerber Scientific Products, retired and was succeeded by Ronald B. Webster, the subsidiary's senior vice president and general manager.—*Tom McCusker*

Call for Entries

AMERICAN MEN AND WOMEN OF SCIENCE, 18th EDITION

Since 1906, American Men and Women of Science has recorded the careers of over 290,000 distinguished scientists and engineers. R. R. Bowker is currently preparing for publication of the 18th edition in January, 1992. This definitive directory includes scientists in 164 disciplines covering the fields of Natural Science, Agriculture, Medicine, Mathematics, Engineering, and Computer Science.

Former entrants are encouraged to update and return their listings as soon as possible to:
R. R. Bowker
Data Collection Center
P. O. Box 2068
Oldsmar, FL 34677-0037

Name _____
Address _____
_____
_____
Telephone _____
Field _____

Please return nomination forms to:
Tanya Hurst
American Men and Women of Science
R. R. Bowker
121 Chanlon Road
New Providence, N. J. 07974

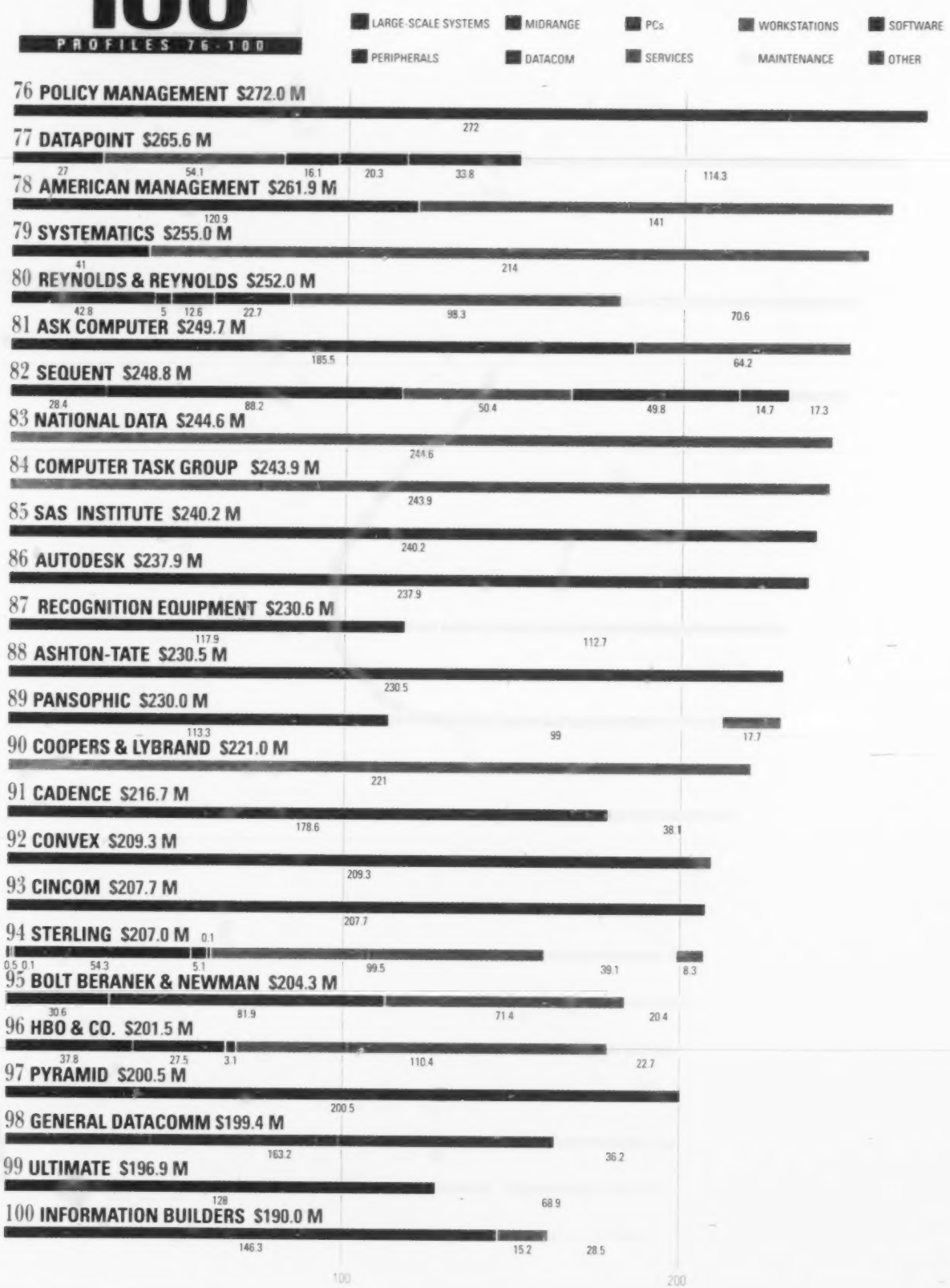
R.R.BOWKER

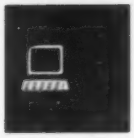
Entrants who have not yet received an update form should call
1-800-824-2470.

American Men and Women of Science is also seeking nominations from the scientific community for men and women who have not previously been included, but who have distinguished themselves as corporate, government, or academic researchers, policy makers or managers in all fields of science and engineering. Using the form below, please submit names and full addresses of nominees.

THE DATAMATION 100

PROFILES 76-100





POLICY MANAGEMENT SYSTEMS CORP.

P.O. Box 10
COLUMBIA, SC 29202
(803)-735-4000

RANK 76
IS REVENUE $272.0 M

Policy Management Systems Corp. is one of a number of companies that focus solely on providing highly specialized applications to relatively narrow vertical markets, in this case mainframe applications for insurance companies dealing with property and liability.

The company enjoyed a 30% growth in revenue for a total of $346 million in 1990. That kind of success moved Policy Management into the investment big leagues, as the firm's stock jumped from regional trading to the New York Stock Exchange last year.

In 1989, the cut-off revenue figure for the top 100 North American companies was $142.8 million. In 1990 it's $190 million.

Policy Management's success is also proving a bit of self-evident wisdom: it can't hurt to have IBM in your corner. Big Blue bought 20% of the company and has signed marketing and product development agreements with it. With the weight of IBM behind it, the firm has launched drives into European markets and into systems for life insurance and health insurance companies.

In 1990, the company purchased PMS Inc., which supplies health insurers with reports on pricing, and Management Data Communications Corp., which provides software and services to group health insurers.

Providing IS services directly to insurance companies is apparently another growing part of Policy Management's revenue stream. Company officials report having signed several major outsourcing clients in 1990, but they are keeping those details secret at the customers' requests.

On the product side, Policy Management is moving toward cooperative processing and strengthening its alliance with IBM. New releases of the company's System 3 software products are compliant with Big Blue's Systems Application Architecture (SAA).

—Chris Sivula

DATAPOINT CORP.

8400 DATAPOINT DRIVE
SAN ANTONIO, TX 78229
(512)-593-7000

RANK 77
IS REVENUE $265.6 M

Datapoint Corp. continued retrenching in 1990. Revenue dropped more than 11%, hitting $265.6 million, and the company showed a loss of $66.7 million, 48% more than the $45 million it lost in 1989. As has been the case in recent years, most of its business came from overseas, particularly Europe, which contributed 78% of revenue.

Company officials admit that U.S. revenue has declined significantly in the past few years. As a result, Datapoint will be moving to Paris by the middle of 1991. Engineering, support, IS, accounting and manufacturing functions, along with U.S. sales, will remain in San Antonio. The relocation also occasioned a change in management: John Harrison became president when Michael M. Michigami, not wanting to move to Paris, resigned.

Datapoint has had to face the fact that the company and its ARCnet networking protocol may no longer be competitive players in the U.S. networking market. "The way the world is shaking out, there's simply no room for their networking protocol. Ethernet and Token Ring are going to be the dominant protocols," says Douglas Gold, an analyst at International Data Corp. in Framingham, Mass.

But Datapoint continues to develop new products to link existing ARCnet networks with other networking protocols. Recently, the company extended its line of multiprocessor servers for open-systems networks. The Datapoint 7860 dual-processor and the 7960 multiprocessor servers allow users access to a wide area of network services, including Open Systems Interconnect (OSI), IBM's Systems Network Architecture (SNA), Transmission Control Protocol/Internet Protocol (TCP/IP), and Datapoint's own Virtual Circuit System (VCF). The company will offer a version of UNIX System V release 4 for its multiprocessor servers.

By the end of this year's third quarter, Datapoint should have its souped-up, 20-megabit-per-second ARCnetplus on the market. But by then, according to analyst Gold, it may be too late to make a difference, particularly in the U.S. market.—*Bob Francis*

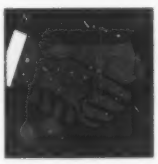
AMERICAN MANAGEMENT SYSTEMS INC.

1777 NORTH KENT STREET
ARLINGTON, VA 22209
(703)-841-6000

RANK 78
IS REVENUE $261.9 M

Telecommunications did the trick for American Management Systems Inc. in 1990, a landmark year for this flourishing systems integrator. Revenue in the telecom arena alone skyrocketed a remarkable 109%, a welcome payoff from partnerships and investments fortuitously made over the past three years. This stellar performance helped AMS gain ground it had lost in 1989, when its federal business was falling and telecom spending was sapping the company's resources.

AMS, which helps IS customers develop new business applications, gets the bulk of its revenue from its telecom and financial sectors. Last year, the financial sector helped out with a hearty 24% boost in revenue. Meanwhile, a slew of lucrative projects doubled the firm's telecom take, which reached $31.5 million. Among these were projects for Rochester Telephone Corp. and Pacific Telecom Inc. AMS also helped Pactel Cellular Services modify its customer service system for Germany and will be involved in a follow-up venture with that firm.



This venture will add fuel to the company's international drive, which started to accelerate significantly in 1990. AMS chairman Charles Rossotti says that the international impetus was felt on both the telecom and financial fronts. "In both areas," he reports, "we started to realize revenues in 1990, especially in our financial industry sector."

Last year, AMS bolstered the domestic side of that sector with contracts from several large banks for the development of consumer loan systems. AMS, Rossotti says, does "business with 40 out of the top 50 U.S. banks, mostly in the consumer area." In an attempt to move further into financial realms, the company took a 10% stake in Advantage KBS Inc., an Edison, N.J., vendor of knowledge-based systems for the insurance industry.—*Linda Runyan*

SYSTEMATICS INC.

4001 RODNEY PARHAM ROAD
LITTLE ROCK, AR 72212
(501)-220-5100

RANK 79
IS REVENUE $255.0 M

Getting together was better than ever in 1990 for Systematics Inc., a facilities management firm that spent most of the eventful year in a manic merger and acquisition mode. The major merger came in May, when $1.6 billion Alltel Corp. took over the 22-year-old outsourcer and gave it an entry into the telecommunications arena. Anxious to establish a beachhead in this new sector, Systematics bought C-TEC Corp.'s Virtuoso software for cellular telephone billing.

Under a separate deal inked in 1990, Systematics will provide C-TEC with data-processing services for its cable television and cellular operations. Systematics derived the majority of its $255 million in IS revenue from such outsourcing contracts, primarily with financial institutions. These contracts contributed to what Systematics classifies as processing revenue, which includes income from systems integration work. This processing pot amounted to $209 million last year, with roughly $5 million coming from consulting and disaster recovery services to banking customers.

Maintenance revenue from the top 100 North American companies grew 12% in 1990.

Approximately 16% of the firm's IS revenue comes from software sales, which hit $41 million last year. To secure its strength on the software and processing sides, Systematics took to the takeover trail. In June, it bought Horizon Software Corp., a developer of software for the IBM AS/400 computer used by midsized financial firms. Four months later, Systematics acquired Computer Dynamics Inc., a provider of remote-processing services for mortgage operations.

Meanwhile, the Alltel merger has already had its advantages for Systematics, which will soon begin handling all of its parent company's data-processing chores. Similar customer contracts are also in the offing. This comes as no surprise to Systematics chairman and chief executive officer John Steuri, who says that even before the Alltel buy-in, "our customers were asking us to not only manage their data processing but also their voice and data networks."—*Linda Runyan*

REYNOLDS AND REYNOLDS CO.

115 SOUTH LUDLOW STREET
DAYTON, OHIO 45402
(513)-443-2000

RANK 80
IS REVENUE $252.0 M

Reynolds and Reynolds Co. depends primarily on the automotive industry for its business, and with an increase in auto dealer bankruptcies in 1990, the firm found itself absorbing more bad debts than usual. IS revenue was down about $1 million in 1990. Now, Reynolds and Reynolds has launched a few new strategies for growth in what is essentially a stagnant market.

Roughly half of Reynolds and Reynolds's 1990 revenue of $595 million came from printing and marketing business forms; $252 million came from IS. Most important to the company's future is how it performs in the United States, which provides about 90% of its revenue. Domestically, the game is one of keeping up with trends.

Shrinking margins on new car sales are driving the auto industry toward larger dealerships, often with multiple locations. At this year's National Auto Dealers Association show in Atlanta, Reynolds and Reynolds introduced an updated version of its ERA dealership system built on NCR Corp.'s Tower machines. ERA integrates business, sales, service and parts applications.

Auto dealers are also trying to compensate for smaller margins through their repair shops. The new ERA system introduced in February tries to ride that trend by integrating with two industry standards—Bell & Howell Co.'s auto parts catalog based on compact disc, read only memory (CD-ROM) and Mitchell International's system for automated body repair estimates.

Augmenting the domestic effort is a push into Europe. In 1987, Reynolds and Reynolds purchased Beri SA, a French systems vendor serving Peugeot SA and Citroen Hispania SA dealers. Although just 7% of Reynolds and Reynolds's IS revenue now comes from Europe, the company expects the unified European market to create new opportunities. As European dealers update their IS technology, Reynolds and Reynolds hopes to capitalize on its 30 years of experience in the United States.—*Chris Sivula*

ASK COMPUTER SYSTEMS INC.

2440 WEST EL CAMINO REAL
MOUNTAIN VIEW, CA 94039
(415)-969-4442

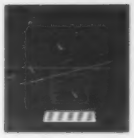
RANK 81
IS REVENUE $249.7 M

With equity financing from Electronic Data Systems Corp. and Hewlett-Packard Co. and with a bank loan from The Chase Manhattan Bank, ASK Computer Systems Inc., last year acquired relational database maker Ingres Corp. for a modest $110 million. The merger sent ASK soaring to nearly $250 million in revenue and beyond its traditional role of supplying manufacturing applications software to industry. ASK, moreover, reached such heights without losing two other important copilots in the company's flight toward factory floor success—Digital Equipment Corp. and IBM.

Few chief executives could have brokered such a transaction besides ASK CEO Sandra L. Kurtzig. Her vision of where her company's manufacturing products had to evolve in the 1990s led ASK down the acquisition path with $40 million from EDS, $20 million from HP and a $50 million loan from Chase. In return, EDS got a 20% stake in the merged company and HP a 10% share.

What resulted was a three-division company whose cumulative 1990 revenue totaled $249.7 million. The Applications Product Division develops and markets Manman manufacturing software for HP and Digital computers, as well as Maxcim and Manman/Process software for Digital computers. The Ingres Products Division offers a wide variety of relational database products and tools. And the Data 3 Products Division creates manufacturing applications, such as SIM/400 for IBM's popular AS/400 midrange system. The Applications and Ingres divisions are roughly equal in size. Combined, they generate about 90% of the new ASK's revenue, with Data 3 contributing the remainder.

Kurtzig got what she wanted from the merger: an engine to drive a high-flying client/server product strategy. At the same time, she was able to accelerate work on ASK's next generation of products—known formally as the Advance series. The new generation of manufacturing software—which will run on all sizes and shapes of systems, not just on select midrange platforms—is late to market. The earliest Advance modules won't get to users until this fall. But Advance could have been delayed even longer had Kurtzig decided to walk away from the failing Ingres and its products—the technologies on which



ASK was building its new manufacturing applications—when the relational database company ran into financial straits last year. "That would have cost us a year because no one had anything close to Ingres's intelligent database," Kurtzig says.—*Tim Mead*

Sequent Computer Systems Inc.

15450 Southwest Koll Parkway
Beaverton, OR 97006
(503)-626-5700

RANK 82
IS REVENUE $248.8 M

Since its founding in 1983, Sequent Computer Systems Inc. has ridden a revenue rocket, increasing its revenue by more than 70% each year. Last year, revenue reached $248.8 million, up from $145.6 million in 1989.

But that seven-year spree came to a grinding halt in the first quarter of 1991, when the midrange multiprocessor supercomputer maker experienced its first revenue decline ever—down 5.5% from the level in 1990's first quarter. Like many industry players, Sequent saw sales dry up in part as a result of the U.S. recession. But another factor—an upgrade in January 1991 of its product line—also caused the company's sales to falter, according to Robert Gregg, Sequent's chief financial officer.

Like Sequent's previous computers, dubbed the Symmetry line, the new Symmetry 2000 series of computers employs multiple microprocessors and is targeted primarily at commercial on-line transaction-processing applications (OLTP) that access relational databases. The Symmetry 2000 machines incorporate Intel 80486 microprocessors and offer a threefold speed improvement over Sequent's still available 386-based line.

Because the new series is totally compatible with the old, Sequent didn't expect its introduction to have a serious impact on the sales of the existing line. That proved to be a miscalculation. "The product transition had an effect on our sales force that we weren't prepared for," says Gregg.

Nevertheless, most analysts believe Sequent is well positioned to continue as a mainstream player in the commercial OLTP marketplace. Many vendors are embracing the symmetric-multiprocessing architecture that the company pioneered, and Sequent's long-term experience with its multiprocessing version of the UNIX operating system running on industry-standard Intel chips should continue to serve the company well. Predicts Gregg: "We're convinced that the entire market will be on symmetric-multiprocessing within five years."—*Dwight Davis*

National Data Corp.

1 National Data Plaza
Atlanta, GA 30329
(404)-728-2000

RANK 83
IS REVENUE $244.6 M

National Data Corp. felt the pinch in one of the major markets for its electronic financial services—retail sales—last year, and it took a $19.6 million hit for refocusing and consolidating its resources. The firm's 1990 revenue of $244.6 million was down more than 11% from the $275.7 million in 1989.

NDC executives say last year's reorganization has set the stage for future growth. The company consolidated several divisions into one Financial and Information Services Group.

Not affected by the reorganization are the company's major markets for its on-line electronic payment, claims-processing and credit authorization services: banking, retail sales, health care and telecommunications. NDC's electronic payments business did well in 1990. The company acquired five more credit card service accounts last year, adding to the two it held previously. The acquisitions gave NDC a direct relationship with more than 90,000 retailers, most of whom are prospects for other NDC retailer services.

New companies to the North American 100: Western Digital, Software AG, Sequent, Coopers & Lybrand, Pyramid and Information Builders.

NDC introduced a new software system, NDC Nets+Retail, which allows the firm's retailer customers to accept checks and credit cards and to perform cash management functions. Eight industry-specific modules are available with the software. In addition, NDC's two-year-old business of real-time pharmacy claims-processing has grown to almost 10 million claims per month, nearly doubling in 1990, say NDC executives.

The firm does less than 10% of its business overseas but is trying to expand that figure. It opened a software services group in its London office in 1990, and it may be adding other overseas support this year.—*Leila Davis*

Computer Task Group Inc.

800 Delaware Avenue
Buffalo, NY 14209
(716)-882-8000

RANK 84
IS REVENUE $243.9 M

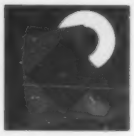
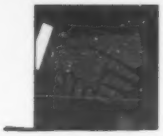
There's probably no better testimony to the benefits of corporate restructuring than the performance of Computer Task Group Inc. in 1990. The company's horizons expanded technologically and geographically, profits reached record heights, and the firm's business opportunities widened considerably. All this came largely as a result of the new foundation that Computer Task Group laid for itself in 1989.

"IBM's investment assured our long-term independence, thereby leading us to examine what we had to be in the 1990s," says CTG chairman David Campbell, referring to the two major events in his company's life in 1989. In June, IBM invested $21 million in the professional IS services company, acquiring a 15% stake. In the fourth quarter of 1989, the company charged $13.6 million against earnings to effect a sweeping consolidation of its U.S. operations. That move eliminated 300 workers.

With Big Blue's bucks and blessing, and lowered operating expenses, CTG set out in 1990 to accomplish what customers and consultants had defined as its strategic mission for the new decade: to evolve into a global firm aimed at helping users apply technology via consulting, systems integration and other services.

CTG struck several tactical targets in 1990 on the way to fulfilling its mission. Most important, its efforts showed up on the bottom line, as net earnings reached $7.2 million on nearly $244 million in revenue. This contrasts sharply with figures from 1989, when the company lost $7.8 million on $233 million in sales. CTG's professional services, which include consulting, document management, database development and a range of other specialties delivered to U.S. customers, yielded $191 million, most of the firm's 1990 revenue. Systems integration services contributed $40 million, and international services chipped in with $13 million.

The company also shot at some new technology targets, via an equity investment in

one company and acquisitions of two others. It bought a stake in Image Business Systems Corp., thereby gaining a presence in imaging. The firm also acquired Connolly Data Systems Inc. and its expertise in networking. "That's a good first step in moving the company in the direction of client/server computing," Campbell says of the Connolly purchase, acknowledging that CTG's forte currently lies in mainframe systems. And the company bought Rendeck International of Amsterdam, The Netherlands, an IS professional services firm serving Western Europe that generated $24 million in revenue in 1989.

Carrying CTG's mission successfully through 1991 will be every bit as challenging as in 1990. So far, the company has stood up to the challenge. In the first quarter of 1991, the company increased revenue to $70.7 million, up 20% over figures from the first three months of 1990. This year, CTG also signed a 10-year outsourcing agreement to run the IS operations for Riggs National Corp., a major bank in Washington, D.C.—*Tim Mead*

SAS Institute Inc.

SAS Campus Drive
Cary, NC 27513
(919)-677-8000

RANK 85
IS REVENUE $240.2 M

In 1990, SAS Institute Inc. put the finishing touches on a new growth path for the 1990s. Additions and revisions to the SAS Application System, the company's integrated bundle of diverse business applications, were made to take advantage of the distributed multiplatform applications environment that SAS executives believe is coming.

SAS executives call the new version 6.X of the SAS Application System the foundation for convincing customers to install SAS systems management software on multiple platforms from the smallest desktop PCs to the biggest mainframes. As part of that move, SAS also began shipping in 1990 the SAS System for OS/2 and for Sun and Hewlett-Packard UNIX workstations.

The company believes its $240.2 million in revenue posted in 1990—a 16.8% increase over 1989's level—reflects both strong sales of version 6 and stronger sales of additional SAS System products to existing customers. SAS began the year with 60,300 products installed at 17,900 sites worldwide and ended the year with 81,500 products at 20,400 sites.

By the end of 1991, SAS says, it will support every major UNIX vendor, as well as every leading desktop environment, and it has a number of development and marketing alliances to back up these offerings. The SAS System continues its strength in the mainframe and mini markets; by the end of 1990 it was already licensed on 300 of IBM's new ES/9000 mainframes.

For 1991, SAS president James Goodnight plans to steer the company deeper into a few vertical markets where the SAS System has been selling well, including executive information systems (EIS), pharmaceutical and laboratory applications, spreadsheets, 3-D graphics and animation.—*Leila Davis*

Autodesk Inc.

2320 Marinship Way
Sausalito, CA 94965
(415)-332-2344

RANK 86
IS REVENUE $237.9 M

Autodesk Inc. racked up another strong year in 1990, as revenue hit $237.9 million, up 33% from the year before. Even so, the company stumbled slightly for the first time since its AutoCAD drafting package for PCs began to lure buyers in the mid-1980s.

The stumble occurred in the fourth quarter, when Autodesk showed signs that its key product upgrade, AutoCAD release 11, was running into difficulty. Release 11 was then shipping only in the 386 configuration, which accounts for a relatively small share of AutoCAD's installed base. In addition, foreign language versions of the product were delayed, compounding the difficulties.

Although Autodesk managed to get several foreign language versions out the door early this year, and a Sun version hit the streets this April, other key products were pushed back until later into 1991—including the critical MS-DOS version for the 80% of customers still wedded to 80286-based PCs.

Still, one stumble does not a high-tech wreck make. Most estimates hold Autodesk to be the leading vendor of PC-based CAD software, with about 65% of the market. And it's showing signs of success at diversification, including the development of extensions to AutoCAD and a foray into multimedia with Animator, a desktop video package for PCs.

Product extensions to AutoCAD are likely to be more important to Autodesk's immediate future, however. In this arena, Autodesk's Advanced Modeling Extension product for AutoCAD shows the most promise. But, so far, the company is making slow progress in the 3-D modeling area, according to Robert Herwick, workstation analyst at Hambrecht & Quist Inc. "That hasn't hurt them yet because the 3-D modeling market is still small," he notes.

The company has apparently succeeded in another area: integrating the products from its 1989 acquisition of Generic Software Inc. into its own product line. The Generic entry-level CAD package for the PC has staved off a slew of AutoCAD wannabes from biting into Autodesk's market share.—*Bob Francis*

Recognition Equipment Inc.

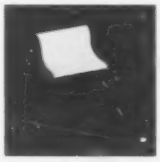
2701 East Grauwyler Road
Irving, TX 75061
(214)-579-6000

RANK 87
IS REVENUE $230.6 M

Recognition Equipment Inc. took two big steps in 1990 to improve its image—an important move for a company rooted solely in the image-processing business. The 30-year-old company improved its financial footing and finished untangling legal snarls with the world's biggest buyer of imaging products, the U.S. government.

REI achieved financial stability by downsizing. It jettisoned much of its European operations, raising $16 million from the sale of three operating groups in Germany. The company also sold off its Wand Product Division for $8.75 million to the U.S. subsidiary of Siemens-Nixdorf Informationssysteme AG. Meanwhile, the workforce dropped from 2,500 to 1,500.

The downsizing lowered REI's revenue for the year to $230.6 million from $255.9 million in 1989. However, losses also dipped in 1990, down to $32 million compared with $39 million in 1989. For the first quarter of 1991, the company earned $3.7 million on $36 million in sales.



Much of the improvement is attributable to Robert Vanourek and Thomas Hurley, who completed their first full year as the company's co-chief executive officers. The pair arrived at the company in October 1989—a month before a federal judge acquitted the firm and its former CEO of charges relating to the company's efforts to win a U.S. Postal Service contract. A dispute over a currency systems contract between the Federal Reserve Board and REI was resolved on the Vanourek and Hurley watch.

The pair has focused REI on image processing—a direction clearly signaled when it acquired Plexus Computers Inc. in 1989. In addition to marketing its own imaging systems, the company sells Plexus's XPD imaging software through and with eight major U.S. computer companies—including Digital Equipment Corp. and Hewlett-Packard Co.

"We've made good progress," says Tom Frederick, vice president of Recognition Equipment's Software Group, "but we still have a ways to go."—*Linda Runyan*

ASHTON-TATE CORP.

20101 HAMILTON AVENUE
TORRANCE, CA 90509
(213)-329-8000

RANK **88**

IS REVENUE **$230.5 M**

Last year, Ashton-Tate Corp. began putting the brakes on the heavy financial losses it had been racking up.

Last August, the firm finally shipped dBase IV release 1.1, an important upgrade of its mainstay database management system. Since then, over 400,000 copies, including upgrades, have been sold. That's important to Ashton-Tate's economic recovery because dBase generated 74% of the firm's revenue in 1990. Net losses decreased from $28.6 million in 1989 to $18.1 million last year.

Due out this summer is an SQL Server edition for version 1.1, intended for corporate developers and independent software vendors who write dBase applications and require access to mainframe-based relational databases. Ashton-Tate also hopes to deliver the overdue dBase IV version 1.1 Professional Compiler soon. "Our number one priority is the dBase Compiler," says David Proctor, vice president and general manager of the company's database division. Ashton-Tate believes that some dBase users will not upgrade to release 1.1 until the compiler, which is suitable for producing more complex applications, becomes available.

iS revenues of 19 North American 100 companies went down in 1990.

In the legal arena, Ashton-Tate is continuing its copyright violation suit against database competitor Fox Software Inc. and PC-UNIX vendor The Santa Cruz Operation Inc. Last year, a federal judge dismissed Ashton-Tate's lawsuit, but then reversed that decision this past April.

Ashton-Tate will join the graphical user interface bandwagon later this year with dBase IV RunTime Plus for the Mac and a Windows version of Applause, the firm's PC graphics software. But the company says a full Windows version of dBase IV may not appear until the first quarter of 1992.

Shipping dBase for Windows is a high priority to diminish the threat from competing database vendors Fox and Borland International Inc. Both of those companies expect to deliver Windows versions of their database programs in 1991.—*John McMullen*

PANSOPHIC SYSTEMS INC.

2400 CABOT DRIVE
LISLE, IL. 60532
(708)-505-6000

RANK **89**

IS REVENUE **$230.0 M**

This 21-year-old developer of systems software had a tough 1990. A substantial net loss, a corporate reorganization and a layoff were the culmination of diversification decisions the company had made beginning in the mid-1980s that didn't pay off.

Pansophic's venture into the graphics business via the acquisition of Genigraphics Corp. in 1989 started to unravel almost immediately thereafter. Pansophic exited the business in April, resulting in a $14.3 million loss on revenues of $232 million.

"We had gotten dispersed," says David J. Eskra, chairman and chief executive. "The graphics business was losing money, inventory was piling up, and we were trying to sell $75K solutions."

Following the sale of the graphics business assets to Autographix Inc., Pansophic reorganized, forming two major business units. The Systems Software Division represents the consolidation of the company's application development and control products with its information retrieval, connectivity and network management wares. The Application Software Division handles the Pansophic Resource Management System, an integrated financial, manufacturing and distribution application, as well as various separate manufacturing, distribution and financial packages. As a result of the reorganization, the sale of the graphics business and other factors, Pansophic's overall number of employees fell by 229, or about 11%, in 1990, dropping to 1,583.

Pansophic's product lines performed unevenly in 1990. Information retrieval products, such as the Easytrieve line, achieved low double-digit growth rates, says Eskra. But one of the leading products in the applications control area, the Telon applications generator, went off plan.

Nevertheless, Eskra remains positive about 1991, citing the company's strengths in three areas. First is the market for computer-aided software engineering (CASE) tools. Second, its plans to "push code" to the UNIX operating system and to workstation platforms such as, perhaps, the IBM RS/6000. Third is the new CIM Series, an off-the-shelf computer-integrated manufacturing approach that integrates plant floor management activities with manufacturing resource planning (MRPII) systems. "I think the business is there, and we now have the organization to go after it," says Eskra.—*David R. Brousell*

COOPERS & LYBRAND

1251 AVENUE OF THE AMERICAS
NEW YORK, NY 10020
(212)-536-2000

RANK **90**

IS REVENUE **$221.0 M**

When you ask George Van Ness how his company drove IS revenue up over 59% to $221 million in 1990, the national director of information technology consulting at Coopers & Lybrand cites three factors:

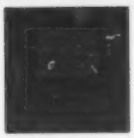
First, the mid-1989 acquisition of Computer Assistance Inc., a Hartford, Conn.-based contract-programming company that complements C&L's mainstay business analysis consulting services with technical assistance for implementing large-system projects.

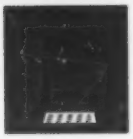
Second, the maturation of a large-scale system integration development team that has in the last eight years cultivated customers spending $1 million to $10 million with C&L instead of the $50,000 to $100,000 that used to be more the norm at the Big Six accounting firm's smaller scale systems integration contracts.

Third, the introduction of senior level people with large-system expertise into the firm. These managers have brought a strong orientation toward developing reverse-engineering as a major area of consulting for the firm. C&L also maintains working relationships with outside people who lend skills in object technology, expert systems and multimedia.

Underlying this growth has remained a philosophy to "amplify and support the client's internal capability," Van Ness says. That means working with the client's staffers on a project rather than sweeping in, taking over, doing the whole job and leaving. "We're not looking to take over a project, but to split the staff 50-50, and ultimately equip them with the tools to manage on their own."

Coopers & Lybrand has a strong business-consulting presence in such market segments as aerospace & defense, automobiles and pharmaceuticals. In March 1990, C&L formed a new unit called Meritus, in conjunction with





IBM, to provide high-level technical consulting to such industries. This 50-person business unit does the diagnostic work, covering everything from business strategy to requirements analysis for computer-integrated manufacturing. The follow-on integration work is done by C&L and IBM.—*Steve Paul*

CADENCE DESIGN SYSTEMS INC.

555 RIVER OAKS PARKWAY
SAN JOSE, CA 95134
(408)-943-1234

RANK 91
IS REVENUE $216.7 M

Three years after harmonizing their efforts, two Silicon Valley start-ups are in cadence with each other and with the entire electronic design automation (EDA) market. Flowing from the merger of ECDA Inc. and SDA Systems Inc., Cadence Design Systems Inc. scored IS revenues to the tune of $216.7 million last year, almost 50% more than the year before. Roughly $180 million of those revenues came from the sale of EDA software for the design of such basic electronic building blocks as integrated circuits and printed circuit boards.

Cadence's meteoric rise in the EDA industry poses a challenge to its prime competitor, Mentor Graphics Corp., which is also much more profitable than its rival. Cadence chief executive officer Joe Costello has already signaled his intention to wrestle the Mentor muscle by vowing to "become the EDA software leader by 1992."

In 1990, the cocky company took several steps toward that goal. Cadence bought design-tool firm Automated Systems Inc., and it forged a joint development pact with Digital Equipment Corp., which it hopes will ease its EDA wares into the next generation.

That generation gap has to be closed quickly for the company to meet its goal and succeed in the rough-and-tumble systems design market that it plunged into last year. This is where Cadence will feel the full might of Mentor. Arming to take on its adversary, Cadence came out in September with its Amadeus systems design package. Soon, the company hopes to be able to provide links in its systems design software to computer-aided software engineering, mechanical computer-aided design and computer-integrated manufacturing packages. Those links could tie customers to Cadence and its hardware independent approach. Last year, that stance won the company contracts from AT&T Microelectronics and Intel Corp. Cadence also inked an EDA software deal with the European Community's program to build a very large scale integration (VLSI) chip.

—*Linda Runyan*

CONVEX COMPUTER CORP.

3000 WATERVIEW PARKWAY
RICHARDSON, TX 75080
(214)-497-4000

RANK 92
IS REVENUE $209.3 M

Of the pack of start-up companies that established the minisupercomputer market in the mid-1980s, few reached the 1990s intact or unbloodied. One exception is Convex Computer Corp., which racked up sales of $209.3 million in 1990, up 32% from 1989's $158.6 million in revenue. Earnings reached $18.4 million last year, an increase of 57% from those of 1989.

Convex's continuing success can be summed up in the phrase "customer satisfaction," according to Theresa Liu, an industry analyst at Montgomery Securities in San Francisco. The company keeps its accounts happy by offering technically solid computers, sophisticated compilers and system software, and strong support, she says.

Despite the market's continuing perception of Convex as a minisuper supplier, the company has considered itself a true supercomputer vendor ever since the 1988 introduction of its C2 family of machines. The top-of-the-line C2 equals the performance of a Cray XMP computer, says Robert J. Paluck, Convex's chairman, president and chief executive officer.

If any doubts remained about Convex's supercomputer claims, they likely evaporated with the introduction of the firm's C3 line of computers last month. The C3, which had not yet been unveiled at press time, is said to support up to eight processors running at 125 million floating point operations per second (MFLOPS). "The C3 will be our broadest computer family," Paluck says, "and systems will range in price from about $200,000 to as much as $10 million."

The C3 introduction comes at a crucial time for Convex, which in the first quarter of 1991 failed to meet its earnings expectations, breaking a string of 25 consecutive quarters of gains. Analyst Liu attributes the falter to the nation's recession.

Still, Convex has more than 470 customers and has installed more than 800 C1 and C2 machines. Many of these sites will turn to the C3 line for an upgrade path, and Liu says the new line should drive a strong fourth quarter. —*Dwight Davis*

CINCOM SYSTEMS INC.

2300 MONTANA AVENUE
CINCINNATI, OHIO 45211
(513)-662-2300

RANK 93
IS REVENUE $207.7 M

In early 1989, Cincom Systems Inc.'s founder, chairman and owner Tom Nies decided the then 21-year-old software company was starting to get too big for its britches. So, he set his managers to downsizing operations and consolidating the company around three main product groups: database management systems, application development tools, and factory and financial management applications.

As a result, Cincom sold its network management application, NET/MASTER, to Reston, Va.-based Systems Center Inc.—complete with customer base and a sales and support staff of 125 employees.

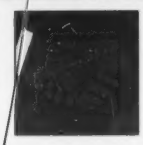
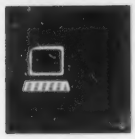
The sale, which generated some $43 million in one-time revenue for Cincom, "was one of those rare transactions where everyone involved benefits," says Nies.

Cincom has subsequently made strides toward balancing its efforts among the three remaining product groups, announcing enhancements or new items in all three lines. Proof of the success of that strategy lies in the more equalized revenues generated by these groups in 1990. Cincom says database technologies accounted for 33% of revenue last year, down from 42% the previous year. Application development products contributed 27%. Cincom's CONTROL manufacturing applications added another 22%. Other miscellaneous, new products and some holdover NET/MASTER income filled in the remaining 18%.

In 1990, Cincom also started shipping two new computer-aided software engineering (CASE) tools that are compliant with IBM's AD/Cycle automated applications development blueprint. These, the Text Applications Development and the Project Management and Control systems, are the first steps in a strategy to bring the MANTIS application development technology under AD/Cycle. As part of that plan, the company plans to start shipping a fully integrated AD/Cycle tool set—the AD/ADVANTAGE—sometime this year.

Cincom also continued to stress the one technical advantage it offers over the several companies with which it competes in the database, CASE tool and manufacturing applications arenas: hardware and operating system compatibility.

Nies announced last year his intention to develop database and CASE products that

included a "Super SAA" capability. By that he meant products that were compliant with IBM's Systems Applications Architecture (SAA) but could also operate in non-IBM environments with little or no modification. Such Cincom products already available run on IBM mainframes, RS/6000 workstations and PCs, as well as on Bull, Digital VAX, Hewlett-Packard and Sun PC platforms.

—J. William Semich

Sterling Software Inc.

11050 White Rock Road, Suite 100
Rancho Cordova, CA 95670
(916)-635-5535

RANK 94
IS REVENUE $207.0 M

Last year was a watershed year for each of the two largest divisions of Sterling Software Inc. The company's Federal Systems Group, which accounted for 43% of overall 1990 revenue, was finally awarded a contested $210 million, five-year National Aeronautics and Space Administration (NASA) contract. Meanwhile, the Systems Software Group, which accounted for 37% of revenue, set three major new strategic initiatives into motion.

These projects include Sterling's Corporate Storage Management Initiative (CSMI), the Corporate Applications Management Initiative and the Corporate Data Communications Initiative. Sterling began delivering products in its Storage Automation Management System, a component of CSMI, in late 1990.

Sterling's fastest growing division, the Electronic Data Interchange (EDI) Group, was created last year and brought in 12% of the firm's 1990 revenue. According to company executives, the enormous growth rate of Sterling's EDI business—a 79% revenue increase in 1990 alone—justified the creation of a separate business group. Part of that growth was fueled by the acquisition of Metro-Mark Integrated Systems Inc. and Lakestone Systems Inc., two EDI companies. The acquisitions position Sterling as the largest provider of EDI software and the second largest provider of EDI services.

The company's Applications Software Group, which specializes in retail and banking software, made up the remaining 8% of the firm's 1990 revenue. Sterling's total revenue in 1990 was $207 million, up from $184.4 million in 1989. Net income for 1990 was $12.4 million, compared with $11 million for 1989.

In 1990, the firm transferred all of its publicly held stock, including common stock, convertible debentures and preferred stock, from the American Stock Exchange to the New York Stock Exchange. The strategy behind the move was to provide more liquidity, access to new capital and more international exposure. Sterling's international markets are growing rapidly, with one-third of the Systems Software Group's business now overseas and the EDI Group expanding quickly abroad. However, because of the large percentage of Sterling's revenue that comes from U.S. federal contracts, only 10% of the company's total 1990 revenue came from overseas.—*Leila Davis*

Bolt Beranek and Newman Inc.

70 Fawcett Street
Cambridge, MA 02138
(617)-873-2000

RANK 95
IS REVENUE $204.3 M

It didn't surprise most analysts when revenue at Bolt Beranek and Newman Inc. dropped by some $30 million last year, while net income turned negative by just a tad more than that.

The real surprise about BBN last year was the unexpected strength the company showed in the final quarter of the year. Revenue rose by 9% after two years of weak growth and regular reports of losses. The source of the strength: BBN's advanced networking technologies.

BBN—which earned some $138 million from the DOD last year, or about 53% of its total revenue—is the company that built the Pentagon's Advanced Research Projects Agency Network, or ARPANET, in the 1970s, one of the nation's first high-speed, secure networking systems. BBN continues to build on and enhance that technology both for the DOD and for private users. Last year, communications services and hardware accounted for about $88 million or nearly 34% of BBN's total revenue. The communications division continues to be the company's flagship; in last year's final quarter, communications revenue increased by a hefty 30%.

In general, however, BBN's other divisions showed somewhat less robust increases in the final quarter. Revenue from all services, which include communications services, software services and other activities, and which account for 70% of company business, increased by only 8%. Revenue from products—including the company's own costly initiative into the multiprocessor supercomputer field—rose by 12%. Sales by the BBN Software division—mostly statistical and analysis software running on DEC VAX minis—barely increased at all during that period.

New initiatives announced by the company for this year include shipment of a new T-300 high-speed data communications processor based on BBN's own multiprocessing technology, and product support for GTE Corp.'s Mobile Subscriber Equipment (MSE) program. MSE shipments to GTE this year are expected to rise by some $9 million.

—J. William Semich

HBO & Co.

301 Perimeter Center, North
Atlanta, GA 30346
(404)-393-6000

RANK 96
IS REVENUE $201.5 M

Health care is big business. And balancing the demands for high-quality patient care with cost-effective services to maintain market share requires the skills of a surgeon.

Founded in 1974, HBO & Co. (not to be confused with the national cable channel) comprises two independent health care subsidiaries: HBO & Co. of Georgia, which provides minicomputer-based software and services; and HealthQuest Ltd., which provides software and services for users of IBM mainframes. These subsidiaries offer a wide range of patient care, clinical, financial and decision-making software. Revenue for 1990 was $201.5 million, down slightly from $203.6 in 1989.

HBO & Co. of Georgia generates about 75% of corporate revenue primarily from two families of software: the STAR family of integrated financial and clinical applications (running on Data General Corp.'s MV series) and the TRENDSTAR decision support system (running on Digital Equipment Corp.'s MicroVAX). Clients range from small rural hospitals to multifacility urban medical centers.

The HealthQuest subsidiary tends to large, complex health care organizations geared toward IBM platforms, primarily mainframes. (HealthQuest also remarkets IBM equipment to the health care industry.) Its two main product lines, CliniPac and MediPac, offer comprehensive applications for patient care, nursing, pharmacy, patient accounting, management and appointments. HealthQuest's Patient Management system allows the simultaneous management of patient information in both the MediPac and CliniPac systems without redundant data entry or file maintenance.

In 1990, HealthQuest launched a joint venture with IBM Information Network to

create QUESTNET. This high-speed nationwide network provides 24-hour support for users of HealthQuest's software and access to a variety of national information databases. Also in the making is a partnership with IBM to develop an image-processing application using ImagePlus.

Last year, HealthQuest introduced QUANTUM, an executive information system that runs on IBM mainframes. Sister subsidiary HBO of Georgia offers the PARAGON EIS system for midrange computers. Both were developed in cooperation with Pilot Executive Software Inc.

President and chief executive officer of HealthQuest Robert Murrie says that "business is focused and healthy" and expects to add 15 new institutions to HealthQuest's customer base in the next year.—*Steve Paul*

Pyramid Technology Corp.

1295 Charleston Road
Mountain View, CA 94039
(415)-965-7200

RANK 97
IS REVENUE $200.5 M

Customer interest in UNIX and a couple of significant new reseller agreements catapulted Pyramid Technology Corp. to a boom in 1990.

The maker of large UNIX systems based on reduced-instruction set computing (RISC) reported calendar 1990 revenue of $200.5 million, up 75% over 1989. Net earnings more than doubled to $18.36 million.

Pyramid chairman and chief executive officer Richard H. Lussier attributed the company's rapid 1990 growth to a couple of new agreements. The first was a big score with AT&T in the original equipment manufacturer (OEM) arena. Under the accord, AT&T will market Pyramid systems exclusively in some accounts and cooperatively with Pyramid in others. The transformation of AT&T from customer to business partner raised Pyramid's income from AT&T more than 10-fold, from $3.5 million to $37 million in one year. As of the last quarter of 1990, AT&T represented 29% percent of Pyramid's revenue.

Pyramid's other major deal was the acquisition of its Australian distributor from reseller The Lionel Singer Corp. The new Pyramid subsidiary reported a strong year, and Pyramid's Australian revenue grew from $3.5 million in 1989 to $21.6 million in 1990.

Although Pyramid expects to continue garnering strong business from AT&T and end-user markets—especially telecommunications and the Federal government—Lussier cautions that Pyramid is feeling the effects of the recession. Growth rates for the first quarter of 1991 are somewhat lower than they were in the same quarter of 1990. Pyramid is expected to begin shipping a new version of its MIServer UNIX superminicomputer based on Mips Computer Systems Inc.'s RISC processor later this year, but Lussier says strong growth may not return until late this year.

"We think it will be the fourth quarter before we see a return to the kind of growth we saw in 1990," says Lussier.—*Jeff Mead*

General DataComm Inc.

1579 Straits Turnpike
Middlebury, CT 06762
(203)-574-1118

RANK 98
IS REVENUE $199.4 M

In the age of networks, it's hard to believe that a company with 22 years of experience in making data communications equipment for the most demanding customers—telephone companies and *Fortune* 500 industrials—didn't grow in 1990. However, such was the fate of General DataComm Inc. last year.

Geography and economics explain why General DataComm's revenue remained flat in 1990. The company relied on North America for 77% of its $199.4 million in revenue in a year that saw most U.S. and Canadian industries suffer a recession. Meanwhile, the European market only contributed 13% of General DataComm's sales. Asia and the rest of the world chipped in the remainder.

However, 1991 and years to come may tell quite a different story for General DataComm. The company is now on much more solid financial ground as a result of trimming costs and raising productivity. Progress in these areas narrowed General DataComm's losses from $7.7 million in 1989 to $345,000 in 1990. More important, the company is displaying a much more aggressive attitude toward developing new products and markets.

Chief among the technologies General DataComm is seeking to exploit in the 1990s is Synchronous Optical Network (Sonet), a standard for transmitting data at speeds of 51.8 megabits per second and faster. The company has added Sonet capabilities to its flagship line of multiplexers, the Megamux TMS family, and to its major network management system, the Megaview Controller. Work on Sonet and other products, such as Mega Bridge, a family of products used to connect local area networks to wide area networks, accounted for much of the $21 million General DataComm spent on research and development in 1990.

One market in which General DataComm clearly wants to widen its presence is Western Europe, where demand for networking products and services continues to be strong, as users lay the groundwork for doing business in the unified arena of 1993. The company has established its first European headquarters, opening an office in Paris to support the efforts of General DataComm's distributors and resellers in the region. One of those distributors remains the Business Communi-cations Group of NV Philips' GL, which markets the Megamux TMS as its high-end Semaplex product.—*Tim Mead*

The Ultimate Corp.

717 Ridgedale Avenue
East Hanover, NJ 07936
(201)-887-9222

RANK 99
IS REVENUE $196.9 M

After a weak 1989, in which The Ultimate Corp. suffered losses approximately equal to the previous year's net income, the company realized that 1990 called for drastic measures.

In May 1990, Ultimate was reorganized into four operating divisions: the Systems Division, which is responsible for systems sales worldwide; the U.S. Customer Service Division, which handles contract service operations; the Professional Services Division, which deals with specialized development software, education and training, direct marketing and consulting; and the Financial Services Division, which takes care of leasing, rental and financial programs.

"With the major restructuring, which was an attempt to cut costs and streamline operations, the company was able to write off $42 million," says James Matthews III, Ultimate's chief financial officer.

In November, Ultimate laid off 175 employees, or 25% of the company's worldwide labor force. The company also reduced senior management salaries by 5% and suspended executive bonus plans.

The good news is that Ultimate's strategy seems to have paid off; the company enjoyed two consecutive profitable quarters since restructuring.

Ultimate is a leading supplier of software, services and systems to the PICK and PICK/UNIX markets. But, like most of the industry, Ultimate has accepted that UNIX will be the open operating system of choice. Now the quest is to position PICK as the database management system for UNIX.

As Ultimate's vice president of engineer-

ing Steve Sorensen says: "In the past three years, Ultimate has recognized or finally realized that with PICK as an operating system we were fighting upstream against the flow of UNIX. We have been in a major direction shift to coexist as an operating environment with UNIX." The company's ULT/ix and Ultimate Plus products may help bring PICK applications to the UNIX world. —*Sarah Lindsey*

INFORMATION BUILDERS INC.

1250 BROADWAY
NEW YORK, NY 10001
(212)-736-4433

RANK 100
IS REVENUE $190.0 M

The foundation of the software house that Information Builders Inc. built is Focus, the 15-year-old firm's flagship fourth-generation language. That foundation became even more solid in 1990, resulting in IS revenues of $190 million, 76% of which was attributable to Focus. The product's influence grew even more pervasive last year as it was ported to a number of different platforms.

That porting resulted from partnerships hammered out with hardware vendors the preceding year. Those pacts were hard won, according to Information Builders president and founder Gerald Cohen, who says that prior to 1989, "the hardware vendors ignored us." Thanks to the newfound cooperation, in 1990 Information Builders was able to announce Focus versions for IBM's AS/400, Tandem Computers Inc.'s NonStop and all major Bull HN Information Systems Inc. platforms, including that company's UNIX systems. Information Builders also rolled out UNIX versions for other systems.

The firm furthered its Focnet strategy of tying disparate computers together by moving a number of cross-platform interoperability wares into production. Last year, the company tied connectivity knots between Digital Equipment Corp. and IBM, as well as between IBM and Sun Microsystems Inc. Information Builders also added object-oriented programming might to its Level5 expert system shell.

Still, the focus is on Focus, which, with a user base of some 800,000, dwarfs PC/Focus with 150,000 customers. That mix was evident in 1990, when "the mainframe sector grew faster than any other part of our business," reports Cohen. To grow Focus on foreign shores, Information Builders added Germany to its European operations in preparation for the unified market of 1993.

On the home front, the company launched a value-added reseller program to vault it into vertical markets. Cohen has his eye set on even loftier sites: "Our goal is to have every data center have a copy of Focus," he says.—*Linda Runyan*

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